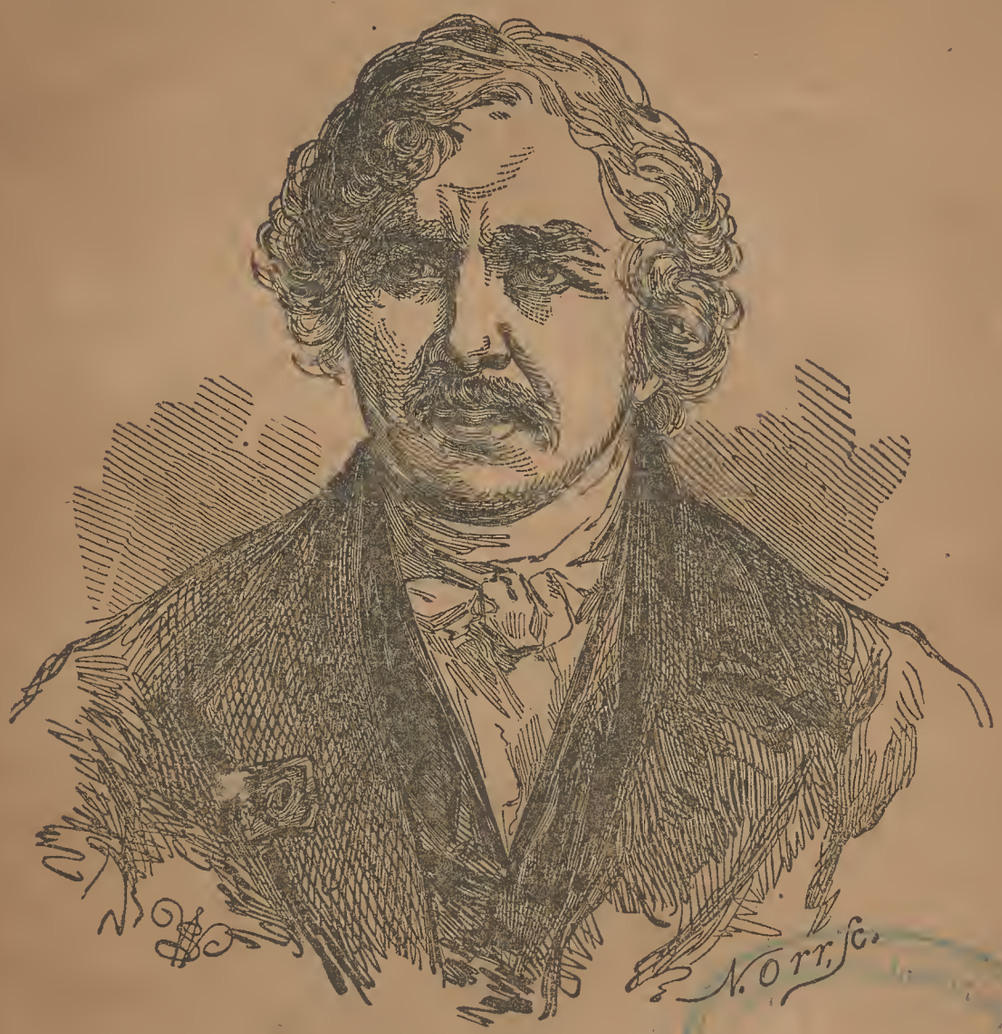
PUBLISHED SEMI-MONTHLY, AT $3 PER ANNUM, IN ADVANCE.

THE

DAGUERREIAN JOURNAL:

Devoted to the Daguerreian and Photogenic Arts.

Also, embracing the Sciences, Arts, and Literature.



Daguerre

VOL. I. MARCH 1, 1851. NO. 8.

NEW-YORK:
S. D. HUMPHREY, EDITOR AND PUBLISHER,
NO. 311 BROADWAY.

SUBJECT TO NEWSPAPER POSTAGE.—See 3d page cover.

CONTENTS.

WILLIAM S. DORR, Printer,
101 Nassau-St., New York.

THE

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Vol. I. NEW YORK, MARCH 1, 1851. No. 8.

ETCHING DAGUERREOTYPE PLATES.

BY W. R. GROVE.

Dr. Berres of Vienna was the first, I believe, who published a process for etching Daguerreotypes; his method was to cover the plates with a solution of gum-arabic, and then to immerse them in nitric acid of a certain strength. I have not seen any plates thus prepared, but the few experiments which I have made with nitric acid, have given me a burred and imperfect outline; and I have experienced extreme difficulty of manipulation from the circumstance of the acid never attacking the plate uniformly and simultaneously. My object, however, in this communication, is not to find fault with a process which I have never perhaps fairly tried or seen tried by experienced hands, and the inventor of which deserves the gratitude of all interested in physical science; but to make public another which possesses the advantage of extreme simplicity, which any one, however unskilled in chemical manipulation, may practise with success, and which produces a perfect etching of the original image; so much so, that a plate thus etched can scarcely be distinguished from an actual Daguerreotype, preserving all the microscopic delicacy of the finest parts of the impression.

One sentence will convey the secret of this process; it is to make the Daguerreotype the *anode** of a voltaic combination, in a solution which will not of itself attack either silver or mercury, but of which, when electrolyzed, the anion will attack these metals unequally. This idea occurred to me soon after the publication of Daguerre's process; but, being then in the country, and unable to procure any plates, I allowed the matter to sleep; and other occupations prevented for some time any recurrence to it. Recently having heard much conversation as to the practicability or impracticability of Daguerreotype engraving, I became anxious to try a few experiments in pursuance of my original notion; and for this purpose applied in several quarters for Daguerreotypes; but, thanks to the exclusiveness of M. Daguerre's patent, I found that to procure a sufficient number of plates for any reasonable chance of success, was quite out of the question.

On mentioning the subject to Mr. Gassiot, he, with his usual energy and liberality, offered to procure me a sufficiency of Daguerreotypes; and it is owing to his

* Strictly speaking, this is a misapplication of Faraday's term; he applied it to the surface of the electrotype; as, however, all continental, and many English writers (among whom I may name Whewell) have applied it to the positive electrode, and as an expression is most needed for that, I have not hesitated so to apply it.

zealous and valuable cöoperation that I have been able to get such definite results as appear worth publication.

Five points naturally present themselves to the consideration of the experimenter on this subject: first, the quantity of the voltaic current; secondly, its intensity; thirdly, the distance between the anode and cathode; fourthly, the time during which the process should be continued; and fifthly, the solution to be employed.

1st. With regard to the first element or quantity, many previous experiments had convinced me that, to give the maximum and most uniform quantitative* action of any voltaic combination, the electrodes should be of the same size as the generating plates; in other words, that the sectional area of the electrolyte should be the same throughout the whole voltaic circuit. It seems strange that this point should have been so generally overlooked as it has been; an electrician would never form a battery, one pair of plates of which were smaller than the rest; and yet the electrodes, which offering of themselves a resistance to the current, from the inoxidability of the anode, are, *a fortiori*, a restriction when of small size, have generally been formed indefinitely smaller than the generating plates; I, therefore, without further experiment, applied this principle to the process about to be detailed.

2nd. *The intensity of the voltaic current.*—Here it appeared to me that, as in the electrotype, where the visible action is at the cathode, a certain degree of intensity throws down metal as a crystal, an increased intensity as a metallic plate, and a further intensity as a pulverulent mass; that degree of intensity which would show on the negative deposit the finest impressions from the cathode, would also produce on the anode the most delicate excavations, and consequently, an intensity which would just fall short of the point of evolving oxygen from the plate to be etched, would be the most likely to succeed; this point was not, however, adopted without careful experiment, the more so, as in one instance Mr. Gassiot succeeded in procuring a very fair etching with a series of ten pairs of the nitric acid battery; however, the results of repeated experiments, in which the intensity has been varied from a series of sixteen pairs to one of the nitric acid battery, were strongly in favor of the above idea, and, consequently, went to prove that one pair gives the most efficient degree of intensity for the purpose required.

3rd. *The distance between the plates.*—As it was proved by De la Rive, that in an electrolytic solution, when the electrodes are at a distance, the action extends a little beyond the parallel lines which would join the bounds of the electrodes, and thus, that the current as it were diverges and converges, it appeared advisable to approximate the electrodes as nearly as possible, so as to produce uniformity of action over the whole plate. Provided a solution be used which does not evolve gas at the cathode, I am inclined to think that the plates may be with advantage indefinitely approximated; but as this was not the case with the solution I selected for the greater number of experiments, 0·2 of an inch was fixed on as the distance, in order that the gas evolved from the cathode should not adhere to the anode, and thus interfere with the action.

4th. *Time of continuing the operation.*—This was a matter only to be decided by experiment, and must vary for the voltaic combination and solution employed. With a single pair of the nitric acid battery, from twenty-five to thirty seconds, was after a great number of experiments, fixed on as the proper time; and as the plate may at any period be removed from the solution and examined, the first experiment should

* I say the quantitative action; for where great intensity is required, as in decomposing alkalies, &c., it may be advisable to narrow the electrodes, so as to present a smaller surface for he reaction of the liberated elements.

never exceed twenty five seconds, when, if not complete, the plate may be again subjected to electrolysis.

5th. *The solution to be employed.*—Here a vast field was open, and still is open to future experimentalists. Admitting the usual explanation of the Daguerreotype, which supposes the light parts to be mercury, and the dark silver, the object was to procure a solution which would attack one of these, and leave the other untouched. If one could be found to attack the silver and not the mercury, so much the better, as this would give a positive engraving, or one with lights and shadows, as in nature, while the converse would give a negative one. Unfortunately, silver and mercury are nearly allied in their electrical relations. I made several experiments with pure silver and mercury, used as the anode of a voltaic combination, but found that any solution which would act on one, acted also on the other. All then that could be expected, was a difference of action. With the Daguerreotype plates I have used the following:—

Dilute sulphuric acid, dilute hydrochloric acid, solution of sulphate of copper, of potash, and of acetate of lead. The object of using acetate of lead, was the following:—With this solution peroxide of lead is precipitated upon the anode; and, this substance being insoluble in nitric acid, it was hoped that the pure silver parts of the plate, being more closely invested with a stratum of peroxide than the mercurialized portions, these latter would, when immersed in this menstruum, be attacked, and thus furnish a negative etching. I was also not altogether without hopes of some curious effects, from the color of the thin films thus thrown down; here, however, I was disappointed; the colors succeeded each other as much as in the steel plate used for the metallochrome; but with inferior lustre. On immersion in nitric acid of different degrees of dilution, the plates were unequally attacked, and the etching burred and imperfect. Of the other solutions, hydrochloric acid was, after many experiments, fixed on as decidedly the best; indeed, this I expected, from the strong affinity of chlorine for silver.

I will now describe the manipulation which has been employed by Mr. Gassiot, and myself, in the laboratory of the London Institution, with very uniform success. A wooden frame is prepared, having two grooves at 0·2 of an inch distance, into which can be slid the plate to be etched, and a plate of platinmu of the same size. To ensure a ready and equable evolution of hydrogen, this latter is platinized after Mr. Smee's method; for, if the hydrogen adhere to any part of the cathode, the opposite portions of the anode are proportionably less acted on. The back and edges of the Daguerreotpye are varnished with a solution of shell-lac, which is scraped off one edge to admit of metallic connexion being established. The wooden frame with its two plates is now fitted into a vessel of glass or porcelain, filled wtth a solution of two measures hydrochloride acid, and one distilled water, (sp. gr. 1.1), and two stou platinum wires, proceeding from a single pair of the nitric acid battery, are made to touch the edges of the plates, while the assistant counts the time; this, as before stated, should not exceed thirty seconds. When the plate is removed from the acid, it should be well rinsed with distilled water; and will now (if the metal be homogeneous) present a beautiful sienna-colored drawing of the original design, produced by a film of the oxychloride formed;—it is then placed in an open dish containing a very weak solution of ammonia, and the surface gently rubbed with very soft cotton, until all the deposit is dissolved; as soon as this is effected, it should be instantly removed, plunged into distilled water, and carefully dried. The process is now complete, and a perfect etching of the original design will be observed; this, when printed from, gives

a positive picture, or one which has its lights and shadows as in nature; and which is, in this respect, more correct than the original Daguerreotype as the sides are not inverted; printing can therefore be directly read, and in portraits thus taken, the right and left sides of the face are in their proper position. There is, however, *ex necessitate rei*, this difficulty, with respect to prints from Daguerreotypes,—if the plates be etched to a depth sufficient to produce a very distinct impression, some of the finer lines of the original must inevitably run into each other, and thus the chief beauty of these exquisite images be destroyed. If, on the other hand, the process be only continued long enough to leave an exact etching of the original design, which can be done to the minutest perfection, the very cleaning of the plate by the printer destroys its beauty; and the molecules of the printing ink being larger than the depth of the etchings, an imperfect impression is produced. For this reason it appeared to me, that at present, the most important part of this process is the means it offers of multiplying indefinitely Daguerreotypes, by means of the electrotype. An ordinary Daguerreotype, it is known, will, when electrotyped, leave a faint impression; but in so doing it is entirely destroyed; and this impression cannot be perpetuated; but one thus etched at the voltaic anode, will admit of any number of copies being taken from it. To give an idea of the perfect accuracy of these, I may mention, that in one I have taken, on which is a signboard measuring on the electrotype plate 0.1 by 0.06 of an inch, five lines of inscription can, with the microscope, be distinctly read. The great advantages of the voltaic over the chemical process of etching, appear to me to be the following:—

1st. By the former, an indefinite variety of menstrua may be used; thus, solutions of acids, alkalies, salts, more especially the haloid class, sulphurets, cyanurets, in fact, any element which may be evolved by electrolysis, may be made to act upon the plate.

2nd. The action is generalized; and local voltaic currents are avoided.

3rd. The time of operation can be accurately determined; and any required depth of etching produced.

4th. The process can be stopped at any period, and again renewed if desirable.

The time I have given is calculated for experiments made with one pair of the nitric acid battery; it is, however, by no means necessary that this be employed, as probably any other form of voltaic combination may be efficient. It would seem more advisable to employ a diaphragm battery, or one which produces a constant current, as otherwise the time cannot be accurately determined. It is very necessary that the silver of plates subjected to this process be homogeneous. Striæ, imperceptible in the original Daguerreotype, are instantly brought out by the action of the nascent anion; probably silver, formed by voltaic precipitation, would be found the most advantageous. I transmit with this paper some specimens of the prints of the etched plates, and of electrotypes taken from them; and in conclusion would call attention to the remarkable instance which these offer, of the effects of the imponderable upon the ponderable: thus, instead of a plate being inscribed, as "drawn by Landseer, and engraved by Cousins," it would be "drawn by Light, and engraved by Electricity!"

A valuable receipt, which every Daguerreian should have in his memory, has been suggested from the fact that one of our fraternity lost his hand by an accidental cut, caused while fitting a likeness in a locket, by the points of copper cutting the palm of his hand, in such a manner as to render amputation necessary. *White of eggs is the best antidote against the poison of copper.*

For the Daguerreian Journal.

PAINTING—ITS ORIGIN AND HISTORY.

BY WILLIAM WALCUTT.

There is no doubt of painting being coeval with written language, or it may be said, that the simple representation of figures, on tablets prepared for the purpose, were the first means used by men to record particular events, actions, and so forth, and may therefore be dated back farther than any written language; and, indeed, may be considered the foundation from which it sprung, it being not improbable, because it is so natural, that the very first dwellers on the earth may have recorded their young history by means of representations of corporeal objects.

Many will say that such rude delineations were not painting, but everything has its beginning. From these simple lines has the perfection of painting sprung, what Artist does not remember the feeble attempts he made at representations when but a child; does he not remember them with pleasure, and did he not then, and does he not now, consider them, feeble as they were, paintings? The first efforts at delineation were painting, without regard to color, or without regard to their truth in delineation. The origin of what may now be called painting, as an art instructive or decorative, is altogether involved in obscurity--authorities differing widely on the subject. Pliny dates its invention to a period antecedent to the siege of Troy, and other writers after. The Egyptians boasted of possessing the art six thousand years before the Greeks, but this has always been doubted. They certainly practised painting at a very early period, and Cambyses destroyed all the monuments of art he found in Egypt, as much as was in his power, which is some argument in favor of the statement; and hence all such monuments as display specimens of the art, must be posterior to his invasion. The remains of Egyptian painting, now extant, are but poor representations of the human, and other figures, showing a meagre advance in the art, being weakly and falsely drawn with no natural grouping or attempts at sentiment. The Phœnicians were an early cultivated people, and have the credit of first inventing letters, and therefore may, by the best authority, lay claim to the invention of painting. King Solomon, one thousand years before Christ, held their ingenuity in such high regard, that he employed them as the master workmen in building his temple, and the scriptures discribe the magnificence of the columns and their capitals, and the borders and cornishes and the doors, besides the great brazen sea, supported by twelve oxen. The coins also of this people, that have come down to us, show in design, and execution, a good condition in the arts.

The scriptures abound in references to the arts. When Jacob took away the daughter of Laban, she stole and secreted from search some of her father's household gods. One of the great commandments, is that the children of Israel shall "not make unto themselves any graven image, or any likeness of any thing that is in the heavens above, or in the earth beneath, or in the waters under the earth." As before mentioned, the temple of Solomon appears to have been richly and elaborately decorated with works of art; and the IV chapter Ezekiel commences with these words: "Thou also, son of man, take thee a tile, and lay it before thee, and portray upon it the city, even Jerusalem." And in the XXIII chapter, 14 verse, it is written thus: "For when she saw men portrayed on the wall, the images of the Chaldeans portrayed with vermillion, girded with girdles about their loins, exceeding in dyed attire upon their heads." Also in the VIII chapter, 10 verse: "So I went in and saw and beheld every form of creeping things, and abominable beasts, and all the idols of the house of Israel, portrayed upon the wall

round about. Also in Numbers xxxiii chapter and 52 verse: "Then he shall drive out all the inhabitants of the land from before you, and destroy all their pictures, and destroy all their molten images."

The Persians, the Arabians, and the Parthians, from their peculiar education, have no claims whatever to the art of painting, a rude representation of the human figure, with them, was considered as vulgar as the appearance of a naked person. Their figures are almost invariably clothed in clumsy draperies, profusely painted. They were worshippers of fire, and used no representations of their deity; and it is a curious fact, that, in their successful invasion of Egypt, they carried away with them no taste for the arts, or imbibed any of the religious principles of that polytheistic country.

The art of painting appears to have remained in the same state in China, without any particular change from time immemorial. They have never attempted anything beyond mere imitation, and that entirely devoid of taste or truth. The human figure, with them, is a ludicrous deformity, and their perspective is gained, by piling one object above another, until the picture is all ground and no sky. Invention and imagination were never known among them; and, although the elaborateness of many of their works is astonishing, yet with such a people, it would be useless to look for the origin and progress of art.

The arts of the Etruscans are famous for the vases they produced. Etruria, in its ancient state, was one of the most powerful and civilized countries in Italy. Though the history of this nation is involved in obscurity, as the Romans tried every means in their power to destroy all its claims to refinement, yet there are sufficient proofs remaining of the height and perfection to which they carried the fine arts. Near the town of Civita Vecchia stood the ancient Etruscan city of Tarquinia, near which are found numbers of sepulchral grottoes, many of which are decorated with paintings and figures much in the style of those on the Etruscan vases. Some of the pictures represent combats, and others dances of females, executed with considerable spirit. The pottery before mentioned, howevsr, affords the greatest number of their specimens of the art of design; the forms displayed in the contour of the vases, no less than the paintings with which they are decorated, show the wonderful attainment in elegance of design, purity of form, and ingenuity of delineation. The power over line, and the facility of execution they reached, may be easily conceived from the absorbant nature of the material upon which they wrought. No retouching was possible; but the whole must have been completely arranged in the mind of the artist before it could be struck off. Pliny states, that in his day, the town of Ardea, an ancient city of Etruria, contained some paintings which he ascribes to a period anterior to the founding of Rome, and mentions with surprise their then perfect state of preservation. At Lacurium also, he describes some pictures of Atalanta and Helen, which were simply painted on the wall, and exhibited great merit in execution. These Caligulo, after a fruitless attempt, failed in removing. Cere, another Etruscan city, boasted some paintings of an early date. All these specimens, although of remote date, have no positive clue by which to ascertain anything positive as to the origin of the art of painting. And we are obliged to turn to Greece for the foundation from whence sprung works still the admiration of the world.

Religion was the motive of Greek art; it was, therefore, natural that they should endeavor to invest their own authors, for they considered themselves of divine origin, with the most perfect forms; and as man possessed that exclusively, they completely and thoroughly studied the elements of his constitution. The climate was favorable to the development of that form, and the

establishment of exercises by their civil and political institutions, created models in nature, which elevated Greek art to the highest excellence.

The next step of the art was the monogram, which is the outline of figures without light or shade, with the addition, however, of parts within the outline. From this the monochrom, or painting with a single color, and a white ground, then covered with punic wax, first amalgamated with a resinous pigment generally of a red, sometimes of a dark brown or black color, was the next advance. Through this inky ground, the outlines were traced with a firm though plyant style, called a cestrum: the line could be altered by the finger or a sponge, and easily replaced by a new one. When the whole was settled, it was suffered to dry, and covered with a brown encaustic varnish; the lights were worked over again, and rendered more brilliant with a more delicate point, according to the gradual advance from mere outline to some indication; and at last to masses of light and shade—thence to the superinduction of different colors, or the invention of polychrom, which, by the addition of the pencil to the style, raised the stained drawing to a legitimate picture, and at length produced that vaunted harmony—"the magic scale of Grecian color."

The period at which the pencil supplanted the cestrum cannot be ascertained. Appolodrus in the 93d Olympiad, and Zeuxis, in the 94th, are said to have used it with freedom and power. Parshasins painted the battle of the Lapithæ and centaurs on the shield of Minerva for Phidias, to enable Mys to chase it. It was nearly a century after this that Appelles and Protogenes had a competition in drawing lines with the pencil, in which "delicacy and evanescent subtlety being the characteristic, some notion of their mechanical skill may be formed."

Encaustic painting was accomplished by using the colors in wax, as they are used now in oil, drying them by a fire, and polishing the surface by dry friction.

Polygnotus is the first great name that appears in history, that any satisfactory data of the arts may be commenced from. He lived about 400 years B. C. So great was his success in the Pœcile at Athens, and the Desche, or public hall at Delphi, that in a great council of the Amphyctons, it was solemly decreed "that his expenses, whenever he travelled in Greece, should be borne at the public charge." His pictures were admired by Pliny, at the distance of six hundred years.

The first painting on record is the battle of Magnete, by Balarchus, and purchased by Candaules, King of Lydia, for its weight in gold, or, as some say, a quantity of gold coins equal to its surface.

After Aglaophon, Phidias, Panenus, Colotes, and Evenor, the father of Parrhasins, came Apollodorus, the Athenian. This painter applied the essential principles of Polygnotus to the delineation of the species, by investigating the leading forms that discriminate the different classes of human qualities and passions. The acuteness of his taste led him to discover, that, as all men were connected by one general form, so were they separated by some peculiar individuality. Pliny and Plutarch considered Appolodorus as the first colorist of his age, and it is very probable, by their descriptions, that he was the inventor of local color and tone. Zeuxis succeeded to Appolodorus, and by uniting in one figure the most perfect parts of many models, produced an ideal form, which, in his opinion, constituted the supreme degree of human beauty. Lucian describes a picture he exhibited at the Olympic Games as remarkable for its invention. It represented a female centaur, suckling her young. It was carried off from Athens by Sylla, but lost on the voyage to Italy.

Parrhasins, a native of Ephesus, but a citizen of Athens, was the son of a disciple

of Evenor, and contemporary of Zeuxis. By his subtle examination of outline, "he established that standard of divine and heroic form, which raised him to the authority of a legislator, from whose decisions there was no appeal. He was a thorough master of allegory, from the fact of his embodying by signs, universally understood, the Athenian people. In a competition with Timanthes, he had the mortification of being declared, by a majority of votes, inferior to him. The subject for competition, was the contest of Ajax and Ulysses for the arms of Achilles.

The sacrifice of Iphigenia in Aulis, by Timanthes, acquired the greatest celebrity of all the ancient pictures. Quintilian says that it was painted in contest with Colotes of Teos—an artist from the school of Phidias, and crowned with victory at its rival exhibition. This picture, which has been the subject of unlimited praise by the ancient critics, has been in modern times obected to, from the circumstance of Timanthes hiding the face of Agamemnon, the father of the victim, to be immolated in his mantle, unable, as it was supposed by his art, to express the entire agony of his grief. Sir Joshua Reynolds observes thus: "If difficulties overcome make a great part of the merit of art, difficulties evaded can deserve but little commendation." The French critic Falconet, has also condemned the artifice. But Fuseli answers these objections very reasonably by saying,—"The subject of Timanthes was the immolation of Sphigenia. Sphigenia was the principal figure, and her form, her resignation, or her anguish, was the painter's principal task; the figure of Agamemnon, however important, is merely accessary, and no more necessary to make the subject completely tragic, than that of Dytemnestra, the mother—no more than that of Priam, to impress us with sympathy at the death of Polyxenia." Again, "they ascribe to impotence what was the forbearance of judgment. Timanthes felt like a father; he did not hide the face of Agamemnon, because it was beyond the power of his art—not because it was beyond the possibility, but because it was beyond the dignity of expression—because the inspiring feature of paternal affection at that moment, and the action which of necessity must have accompanied it, would either have destroyed the grandeur of the character, and the solemnity of the scene, or subject the painter, with the majority of his judges, to the imputation of insensibility. The same expedient was resorted to by M. Angelo, in the figure of Abijam, and by Raphael in the expulsion from paradise.

These were the artists who formed the second school of art, and established its end and limits. On it was founded the third period of style, in which refinement induced a grace and beauty not to be surpassed. The masters of this period were—Appelles, Protogenes, Aristides, Euphranor, Pausius, and the pupils of Pamphilius, and his master Eupompus. The last named artist was of Sycion; and his authority was so great, that out of the Asiatic and Grecian chords of painting he formed a third, by dividing the last into the attic and Sicyonian. Pliny says that, when consulted by Zysippus on a standard of imitation in art, he pointed to the crowd passing by—observing that nature, not an artist, should be the object of imitation. Pamphilus, a Macedonian, the master of Appelles, adopted the doctrines of Eupompus. To the art of painting, he joined the study of mathematics, and held, that, without the aid of geometry, no artist could arrive at any perfection. In Appelles, we are told by Pliny, unrivalled excellence was found. Grace was his powerful and peculiar faculty, in which he surpassed all his predecessors. His Venus Anadyomene, which was long after purchased by Augustus for one hundred talents, or £20,000 sterling, was esteemed the most faultless creation of the Grecian pencil, the most perfect example of that simple yet unapproachable grace of

expression, of symmetry of form, and exquisite finish, in which may be summed up the distinctive beauties of his genius. Hotogenes was next to him in merit. The most celebrated of his works was his figure of Jalysus, with his dog, which occupied him seven years. Aristides, of Theles, and cotemporary of Appelles, was the first, who, by the rules of art, obtained a perfect knowledge of expressing the passions and affections of the mind. In one figure, he expressed the anguish of maternal affection, and the pangs of death. Euphranor, the Isthmian, and pupil of Aristides, is said to have carried this refinement of expression still further. Skilled in Sculpture, as well as in Painting, his conceptions were noble and elevated; his style masculine and bold; and he was the first who distinguished himself, by imparting majesty to his heroes.

Asclepiodorus, the Athenian sculptor, as well as painter, was as the latter, celebrated for the beauties of a correct style, and the truth of his proportions. Appelles allowed himself to be, in these respects, as much his inferior to this artist as he was to Amphion on the good ordering and disposition of his figures. About this period appeared Nichomachus, Nichophanes, Pyreicas and others. Nichias, an Athenian, 322 B. C., was in great repute for the great variety and noble choice of his subjects, for the mode of distributing his lights and shadows, and for great skill in the representation of animals. In Rome, 300 B. C., Fabius, a noble Roman, painted the Temple of Health, and gloried so much in the art, that he assumed the name of Pictor. Without a further enumeration of masters, for a long period after the reigns of Vespasian and his son Titus, painting, as well as sculpture, continued to flourish in Italy. Even under their successors Domitian, Nerva and Trojan, they met with as much encouragement as they did in the most palmy days of Greece, although painting was used in mere ornamental decorations—that is, to a great extent, and artists had sunk, for the most part, to the standard of mere mechanics. Under Adrian, Antonine, Alexander Severns, Constantine, and Valentinian, the art of painting continued to be an object of interest; but at length, in the reign of Phocus, with the fall of the Empire, with the rest of the noble arts and sciences, it was involved in the common heap of ruins.

(To be continued.)

BROMINE.

We give the following interesting combination and experiments with bromine, as found in Hill's Treatise:—

"Discovered in 1826, by M. Balard, a young chemist of Montpellier, France. He named it *Muride*, because obtained from the sea; but it acquired its present name from a Greek word, signifying *rank*, or *dead odor*. It exists in nature in very small quantities. It is found in the waters of every sea which has been tested for it: it is also found in many mineral and salt springs. We have not been able to determine to whom belongs the honor of discovering its use as an accelerator in Daguerreotype. Having corresponded with Prof. Morse, (who was certainly one of the first who took portraits by the Daguerreian process,) Dr. Draper, and others, to whom this honor has been awarded, they refuse to claim it. Prof. Silliman, who is supposed to know everything relating to science, writes to me that he does not know this. I am quite inclined to place the wreath on the brow of the inventor of the Magnetic Telegraph.

Process.—When common salt is prepared from sea-water by evaporation and crystalization, a liquid remains which goes under the name of *bittern*. This liquid on passing chlorine through it, is tinged with a deep yellow color. The liquid is now distilled, and the vapor passed over a substance, (muriate of lime), which has a powerful attraction for water. A small

quantity of bromine is thus obtained.—Another method is to agitate the chlorinated bittern with a portion of sulphuric ether. The ether dissolves the bromine, from which it receives a beautiful red tint, and on standing, rises to the surface. Agitate this solution with caustic potash, and the bromide of potassium and bromate of potassa will be formed. Evaporate the liquor and the bromide of potassium will be left from which bromine may be distilled.

Properties.—At common temperatures, it rapidly volatilizes, giving red vapors of a most disagreeable smell. Its color, when held between the eye and the light is a deep hyacinth red. Like oxygen, chlorine, and iodine, it is a non-conductor of electricity, and a negative electric. It boils at 116·5°, and congeals at 4° Fahr. into a brittle solid. It is a powerful poison; even its vapor would no doubt prove fatal, if inhaled in large quantities. A single drop placed in the beak of a bird destroys it instantly. Operators cannot be too cautious in using it. A very small drop spattered in the eye would destroy the sight. Bromine is very corrosive. A lighted taper burns for a few moments in its vapor, with a flame green at its base, and red at the top, and is then extinguished. It is soluble in water, alcohol, and ether; the latter is the best solvent. With water at 32° Fah., if forms a *hydrate*, in crystals of a fine red color. It gives to a solution of starch an orange color. Chlorine will displace it from all its combinations with hydrogen.

Chloride of Bromine.—Formed by transmitting a current of chlorine through bromine, and condensing the disengaged vapors by a freezing mixture. The factitious article is more simply formed, and is equally good as an accelerator, but not as quick. See page 25, Part I. M. Bissou, a Frenchman, found that the real chloride of bromine is so sensitive, that Daguerreotype proofs are taken by it in half a second. He succeeded in taking persons and animals in the act of walking.

Bromic Acid may be obtained by pouring sulphuric acid upon a dilute solution of bromide of baryta, and evaporating. No interest.

Bromide of Baryta.—Boil of protobromide of iron with moist carbonate of baryta; carefully evaporate and it will crystalize in white rhombic prisms, which have a bitter taste, are slightly deliquescent, and soluble in water and alcohol.

Bromide of Carbon.—Formed by mixing one part of periodide of carbon with two of bromine. Two compounds are formed, the *bromide of carbon*, and the *sub-bromide of iodine;* the latter is removed by a solution of caustic potassa. It is liquid at common temperatures, but chrystallizes at 32° Fahr.; sweet to the taste, and of a penetrating ethereal odor; distinguished from the protiodide by the vapor which it emits on being heated. The *periodide of carbon* is made by mixing an alcoholic solution of pure potash and of iodine. It forms crystals of a pearly lustre, sweet to the taste, and of a saffron odor. The *protiodide* is formed by distilling a mixture of the preceding componnd with corrosive sublimate. Sweet in taste, and of a penetrating ethereal odor.

Rromide of Magnesium.—Dissolve magnesia in hydrobromic acid. It will chrystalize in small acicular crystals, of a sharp taste, very deliquescent and soluble.

Bromide of Sulphur.—Pour bromine on sublimed sulphur. There is formed an oily liquid of a reddish tint.

Bromide of Phosphorus, is formed by bringing phosphorus and bromine into contact in a jar filled with carbonic acid gas. Vaporizes by heat, and is decomposed by water.

Bromide of Silicon, is prepared by burnlng silicon in the vapor of bromine. A very dense, colorless liquid, emitting dense fumes. We have used this article as an aceelerator, and it produces a beautiful

but singular picture. It works quick, but possesses no particular advantage.

Bromide of Zinc.--Prepared by digesting a solution of bromine with zinc filings. The iodide is formed in a similar manner. No interest.

Hydrobromic Acid.—Mix the vapor of bromine with about an equal bulk of hydrogen gas, and introduce a coil of red-hot platinum wire. Red-hot iron answers equally well. The combination takes place slowly without explosion. Or, it may be formed by placing a small piece of phosphorous in a glass tube filled with water, and dropping it upon a little bromine. The The hydrobromic acid passes over in the form of a gas, and may be passed through water, which will absorb it. *Hydriodic Acid* is formed in the same way, using iodine in place of the bromine. Hydrobromic acid is decomposed instantly by chlorine and nitric acid.

The French and German bromine is generally considered the best; but the American manufacture is by no means to be rejected, as it is frequently very excellent. Bromine is sometimes adulterated with naptha.

NITRATE OF SILVER.

DECOMPOSED BY THE CURRENT OF A GALVANIC BATTERY.

Mr. Matteucci has observed that the *black* deposit obtained on the cathode, in the electrolysis of this salt, instantaneously becomes *white* when the current ceases; that it does not occur except when the solution is weak, because from strong solutions, crystalline silver is at once deposited; that if a portion of the deposit, after it has became white, be suspended between the electrodes while the current passes, those portions towards the anode again become *black*, if the experiment is made in a solution of the nitrate, but not if in mere acid water; it will, however, occur if a mere drop of nitrate is added to the solution. If a plate of a glass is interposed between the electrodes, the phenomenon does not occur; this is attributed to the great reduction of intensity. It is suggested "that the black deposit is formed of oxide of silver, which is preserved by the passage of the current, and which, when the current ceases, passes immediately to the metallic condition."

OXIDE OF SILVER.

Place pieces of silver in a glass vessel, and pour on them about equal parts of water and strong nitric acid; the metal will soon dissolve, giving off fumes of nitric oxide. Should the solution have a green hue, which is invariably the case, unless the metal has been obtained fine from the refiners, it indicates the presence of copper, in which case immerse some pieces of copper in the solution, and the nitric acid, by elective affinity, will combine with the copper; and a precipitate of pure silver, in the form of grayish powder, will take place. Throw away the liquid and wash the silver precipitate several times in sulphuric acid and water, and afterwards in water alone. Then re-dissolve it as before, in nitric acid and water; and a *solution of pure nitrate of silver* will be obtained. Place this in an evaporating dish, or a saucer, and apply the heat of a spirit-lamp, or place the saucer by the fire-side, till some portion of the liquid is driven off in vapor. Allow the residue to cool, and it will shoot out into long colorless transparent crystals, which are *nitrate of silver*. They must be handled with care, as they possess the property of staining animal and vegetable substances with an almost indelible black;—fused nitrate of silver being the lunar caustic of surgery, and the main ingredient of marking-ink. Next prepare some *lime-water*, by stirring lime into water and filtering the solution. As lime is very sparingly soluble in water, requiring, at 60° Fahrenheit, 750 times its weight. it is necessary to make an abundant supply. Place the lime-water in a glass or other

vessel, and drop in it a *few* crystals of nitrate of silver; the colorless solution will instantly assume an unsightly brown hue; and, after remaining quiescent for a time, the *oxide of silver* will subside in the form of a dark brown precipitate. The liquid is then poured off, and the precipitate is washed with water. Before throwing away the liquid, fresh lime-water should be added to it; and if the dark hue recurs, the precipitate must be allowed to subside again; if no change takes place, it may be inferred that the silver is all extracted. The oxide of silver should not be dried, but be kept in bottles with water.

POTASSIUM.

CYANIDE OR SIMPLE CYANURET OF POTASSIUM.

Before entering into the preparation of this ingredient, I may mention that the *prussiate of potash* of commerce has, by many young experimentalists, been mistaken for the above article, because it is often sold, by those unacquainted with chemical technicalities, under the name of *cyanuret of potassium*. It is, in chemical parlance, termed *ferro-cyanuret*, from its containing a certain portion of iron; and differs in its properties, very materially, from the *simple* salt. It is of a bright yellow color, and is converted into the colorless, simple cyanuret in the following manner:

Take 4 ounces of the yellow prussiate, break it in small pieces, and well dry it on a plate of iron; then reduce it in a mortar to exceedingly fine powder. Dry and pound in like manner one and a-half oz. of carbonate of potash. Incorporate the two ingredients thoroughly. Place a Hessian crucible in the fire; and when it attains a red heat, throw into it the prepared mixture, and closely cover the crucible. Keep up the heat, and the contents of the crucible will soon fuse; and the fluid mass will become red-hot. After this, immerse in it, from time to time, a hot glass rod; the mass which adheres, is in the early stages of the process brown on cooling; as the heat is continued, it appears yellowish, and finally, colorless and transparent. The operation is then complete: the crucible must be removed; and after its contents have been allowed to settle, the fused mass may be poured off; the greater portion of which consists of the *simple cyanuret of potassium*. This salt is very deliquescent, and must therefore be retained in close bottles: it will readily be recognized by its powerful odor,—that noticed in peach blossoms. The mere mention of *prussic acid* entering largely into its composition, will be sufficient to induce my reader to exercise common caution in handling it.

Having these ingredients prepared, take one pint of pure rain or distilled water; add to it two ounces of the cyanuret of potassium, shake them together occasionally, until the latter is entirely dissolved; and allow the liquid to become clear. Then add a quarter of an ounce of oxide of silver, which will very speedily dissolve; the dissolution may be hastened by heat, and after a short time, a clear transparent solution will be obtained.—*Walker*.

STEREO-CHROMIC PAINTING.

A new mode of fresco painting, called *Stereo-chromie*, which has for a long time excited attention among the artists of Germany, has it appears been perfected by a pupil of Kaulbach, in his own studio in Munich. The design is Kaulbach's, and the work was executed under his superintendence. It represents the figure and character of a Prophet, and will be sent to the London Exhibition. 'The figure, grand and majestic as it really is, cannot be expected to convey to the English public anything but a faint idea of the genius and skill of Kaulbach,' but as a specimen of this new and wonderful mode of painting, it will be regarded, by artists, with the greatest curiosity.

Stereo-chromie was discovered by *Ober-*

grath von Fuchs, a distinguished chemist; and is considered by German artists as one of the greatest discoveries of the age. They claim for it great advantage over ordinary fresco and encaustic painting, in its superior durability and the power which it affords the artist of retouching and glazing his picture. The colors are mixed with water, the whole being permanently fixed by occasional sprinklings of water, in which a certain proportion of fluoric-acid (*Flass-spath saurs*) is mixed.

Stereo-chromie is in fact a preserver of the wall on which it is painted, By a certain chemical action of the solution sprinkled over the picture, while in progress, the whole ground on which it is placed, and the picture itself becomes one hard flinty mass, the very colors of which are converted into the hardest stone.

This singular species of painting resists, it is said, every influence of climate; and may be securely used as an external coating for buildings in any part of the globe. Neither is the artist confined to any particular time in executing it, leaving off when he pleases and for any length of time. In these points it is a most important recommendation, which cannot by any means apply to fresco work, nor, except within certain limits, to oil painting. The highest advantage of all, however, is that the same part may be painted over as often as the artist please, which is impossible in fresco; and consequently the most perfect harmony may, by this new mode be preserved throughout the largest possible painting. In fresco the artist is the slave of his materials; here, he is the arbitrary master and to the fullest extent.—*Banner of the Union, Pa.*

WATER.

Water intended to aid in conducting chemical experiments, should, so far as possible, be free from all foreign substances. As the Daguerreotype process is one of the most difficult in the range of chemical science, the Daguerreian should have at hand the best that circumstances will admit. We have learned, from experience, the disadvantages attendant on those who travel in the country, from village to village in the practice of the Daguerreotype art.

When *Distilled Water* can be obtained, it should be used. It must have no smell, taste, or color; it must evaporate without leaving a residue; it must give no precipitates with solutions of nitrate of silver, chloride of barium, superoxalate of potash, caustic alcalies, carbonated alcalies, sulphurated hydrogen, or hydro sulphate of ammonia.

Rain Water generally contains carbonic acid, carbonate of lime, and chloride of calcium.

Spring Water contains the same impurities as rain water, superadded to chloride of sodium, sulphate of lime, carbonate of iron, &c.

River Water.—More free from salts than spring water, but often contains a large quantity of decomposing vegetable and animal matter. This is particularly the case with water taken from the Hudson, from Troy to its mouth; also, the Mississippi, and, in fact, almost all large streams which are navigated.

Lake Water.--All descriptions of stagnant water abound in half-putrified organic remains, as all well know, that the smaller the bulk of liquid, as in the case of the swamp or marsh, the more impure and the more unwholesome it is.

To purify Water.—Much has been said about purifying water for Daguerreotype use. We look upon this, so far as chemical agents are employed, in most instances a loss of both time and money; let every one *filter* the water for use *often* and freely and we will guarantee that *success* will be his *reward.* We will class water in the following order:—

1, Distilled water; 2, rain water; 3, brook water; 4, well water; 5, spring water; 6, river water: yet the water from

some of our western lakes would, we think be fully equal to rain water. We have used the water from Seneca lake, and have found it possessing less animal and vegetable matter, than found in the water from any well which we have been compelled to use.

Isinglass, as it is generally called fish glue, is prepared from the air-bladders of the sturgeon. It is found in commerce under various forms, such as large strings, small strings, and leaves. It is always white, semi-transparent, dry, fibrous, horny, of a faint odor and insipid taste. When a very thin leaf is moved between the eye and the light of the sun, a species of chatoyance is perceived. If macerated in cold water, Isinglass swells and softens; if boiled in water, it dissolves almost without any residue and forms a solution, which, on becoming cool produces a semi-transparent jelly. There are several counterfeits, but all are easily detected.

PAPIER-MACHE.

Papier-Mache.—Pulped paper moulded into forms. It possesses great strength and is a valuable article in the manufacturing of cases for Daguerreotypes. It may be rendered partially waterproof by the addition of sulphate of iron, quicklime, and glue, or white of eggs, to the pulp; and incumbustible by the addition of borax and phosphate of soda. The papier-mache Daguerreotype cases, tea-trays, waiters, snuff-boxes, &c., are prepared by pasting or glueing sheets of paper together, and submitting them to powerful pressure, by which the composition acquires the hardness of a board when dry. Such articles are often inlaid with mother of pearl, and japaned, and are then perfectly water-proof.

CHLORIDE OF CALCIUM.

Chloride of Calcium.—This is so easily manufactured that any Daguerreotypist can make it with but little difficulty. Saturate dilated muriatic acid, say three pints of water to one of acid; this should be filtered through a sponge and then allowed to stand until all the aquus solution has evaporated and the calcium crystallized. This may be improved by it being placed in a crucible; and fused with a quick fire, then poured out on a flat stone. When cold, it should be broken and put in close bottles. This is much used by Daguerreotypists as it possesses a strong affinity for water; consequently, it is a valuable auxiliary in keeping the iodine dry. It is also much used for drying gases and absorbing water from ethereal and oily liquids, in organic analyses.

MURIATE OF AMMONIA.

Muriate of Ammonia—*sal ammoniac.*—This is used by *few* to bleach Daguerreotype impressions, and relieve them of the "*blues*;" should, however, the plates be *well* cleaned and the mercury at a proper temperature, there will be no need of this preparation: yet, as a number have requested, we give the following combination, knowing that all Daguerreotypists are troubled more or less with solarized impressions, they may be more particularly with the *blues*. Make a saturated solution of muriate of ammonia, in pure water, and filter through paper. This reduced with an equal quantity of water before used; when the linen or any portion of the impression is badly solarized, after removing the coating with the hypo-sulphite solution, thoroughly rinse the plate with water, then pour the bleaching solution over the surface of the impression in the same manner as in gilding.

If the solarization be very deep, apply the lamp beneath and slightly warm the plate, pour suddenly off, and without rinsing, quickly apply the gilding and gild in the usual way. The whole operation must be quickly performed, or the chlorine soon attracts the shade of the picture. There may be instances when this solution may prove of advantage, as, for instance, when black velvet and milk white are wanted in the same impression. We have seen it

operate with pleasing success; but repea that *few* only use it, yet as in a single instance it might be of value, we have given it. As much of the muriate of ammonia, in common, is adulterated, we will give a few tests which all can try.

When pure, this salt is totally volatilizable by heat; if a small portion on being heated on a piece of platinum foil over a spirit lamp leaves any fixed residue, it is adulterated. It should dissolve entirely in water; if it leaves an *insoluble residue* it is adulterated. The impurities generally found in sal-ammoniac, are sulphate of ammonia, sulphate of soda, chloride of sodum, and chloride of potassium; neither of these are considered injurious in the *bleaching solution* Occasionally it contains lead, iron, and copper. The presencc of sulphuric acid may be detected by means of a diluted solution of *chloride* of barium, added to a *weak* solution of muriate of ammonia, in water, this will produce a white prccipitate, which is the more copious and dense, the less the liquor is diluted. If it contains *lead* ad- to a small portion of it, contained in a test tube, a little diluted *sulphuric acid*, or a few drops of a solution of *sulphate of soda* (glauber's salt), if the liquid contains lead there will be prevalent a white powder, or precipitate, this powder scarcely dissolves at all in diluted acids, but it dissolves in a solution of caustic of potash: *iron*, mix a solution of the yellow prussiate of potash with a solution of red prussiate, a few drops of this added to a weak solution of muriate of ammonia will produce a blue precipitate; *copper*, pour about half an ounce of the liquid in a test tube, and add to it a few drops of liquid ammonia, if copper is present, the liquid will assume a blue color. Sal ammonia is known by giving out the odor of ammonia when mixed with caustic of potash: when sal-ammonia possesses a *brownish* color, it indicates the presence of charcoal, or empyreumatic oil; such sal-ammoniac is good for some purposes, but wholly unfit for *chemical purposes.*

When sal-ammoniac leaves a non-volatile residue, it may contain *sulphate of soda.* This is the principal cause of failures with the bleaching solution, as the sulphate of soda has a tendency to blacken rather than bleach Daguerreian impressions. The sulphate of soda as well as the chloride of sodium, is often found in unpurified sal-ammoniac to the amount of ten per cent.

When sal-ammoniac contains much sulphate of ammonia, it fuses and sputters before it sublimes; whereas it otherwise sublimes without fusing. When sal-ammoniac sublimes without residue, but gives a precipitate when its sclution is tested with a solution of chloride of barium, it contains sulphate of ammonia; but when it leaves a non-volatile residue, the precipitate indicates sulphate of soda or sulphate ol magnesia.

BROMIDE OF SILVER.

NATIVE BROMIDE OE SILVER AND ANALYYSES.

M. Berthier says, that in the district of Plateros, seventeen leagues from Zacatecas in Mexico, silver ore is found in two different states; first, native silver; and secondly and principally in a state of combination in small olive-green or yellowish crystals, supposed to be chloride, but which he found to be bromide of silver. According to M. Duport, from whom M. Berthier received these specimens, this substance is not rare in Mexico, but occurs frequently in fine cubic and octahedral crystals.

The specimen examined by M. Berthier was from San Onofe. It was compact, of a slightly reddish gray color; fracture uneven; splendent; penetrated with small cavities, some of which were partially filled with a substance of a dull pale yellow color, and which the miners call oxide of lead; other cavities contain very small imperfect crystals; which are brilliant, and of a pale olive green-color, and have the appearance of chloride of silver. This specimen was very rich, for it yielded

0.0688 of silver, and contained 0.45 of carbonate of lead, which, intimately mixed with quartz and a little oxide of iron, formed the principal portion of the mass.

M. Berthier has also found this mineral among the silver ores of Huelgoeth, department of Finistère in France. Two specimens were obtained by him: the first of these is described as being porous or scoriform, containing white quartz imbedded in foliated hydrate of iron. On the edges of the foliatsd iron ore the naked eye could distinguish small cubic grains of a pearl-white color, which had all the characters of chloride of silver.

The second specimen had the appearance of compact oxide of iron, containing here and there milk-white quartz; it was throughout impregnated with chloride of silver, which occasionally appeared in the form of very small brilliant crystals. To analyze this mineral, 10 grammes were first treated with ammonia, and heat to dissolve the chloride of silver, and afterwards by boiling hydrochloric acid to dissolve the oxide of iron; this acid also dissolved a certain portion of lead, which probably was in the state of phosphate. The quartzose residue weighed 32.6 grammes: it contained 0.17 gramme of silver, which must have been in the metallic state: the ammoniacal solution gave by boiling and saturarion with nitric acid, 1.84 gramme of chloride of silver, which, supposing it to be pure, contained 1.40 gramme of silver, which, added to 0.17 gramme remaining in the quartz, gives a total of 1.57 gramme; a result which differed so very little from that obtained by essaying, as to prove the absence of bromide of silver, and that this was the case was confirmed by additional experiments.

After this a third specimen was received from Huelgoeth; it was very small, but as rich as the foregoing, and in it there were distinguishable, besides granular cubic crystals of chloride of silver, other grains of an olive-green color, which had exactly the same appearance as the bromide had. Platerost and the following experiments proved the presence of the substance.

Five grammes of the pulverized mineral were boiled in a solution of oxalic acid, until the oxide of iron was perfectly dissolved: the residue weighed about a gramme, and it evidently contained a mixture of canary-yellow and white grains. It was digested in hot solution of ammonia until all the yellow powder disappeared; it required a large quantity of the alkali for this purpose, which would not have been the case to dissolve pure chloride. The solution was gradually saturated with nitric acid, and it was observed that the successive deposits formed had an evident yellow tint, but gradually diminishing in intensity, except the last, which were white. The yellow deposits were collected and examined in the following manner:—A portion was treated with chlorine and æther; the æther became of a yellow color. Another portion was dissolved in ammonia, hydrosulphate of ammonia was added to the solution, and the black precipitate formed was separated, and was found to be pure sulphuret of silver. The liquor was concentrated by exposure to the air, and filtered to separate the sulphur which was deposited; a little potash was then added, and it was evaporated to dryness; acetic acid was added to saturate the excess of potash, and it was again dried.

To determine whether the saline residue contained a bromide, a small portion of it was treated in a tube with pure nitric acid, and a yellow liquid was immediately obtained. Another portion was mixed with peroxide of manganese, and the mixture was placed in a glass tube; a few drops of concentrated sulphuric acid were added, and when gently heated, red vapors were immediately disengaged, and after some time there were deposited on the sides of the tube small drops of a red liquid. The existence of bromine was therefore evident,

and it was proved that the bromide was unmixed with iodide. Bromide of silver appears to be rare at Huelgoeth; but it may be readily distinguished from the chloride by its greenish or canary-yellow color, which is characteristic of it. It is remarkable that it occurs with the chloride in the same specimens, but without there being an ntimate mixture of the two substances.

The Daguerreian Journal.

NEW YORK, MARCH 1, 1851.

HILLOTYPE.

Since the announcement of the HILLOTYPE, in the last number of the Daguerreian Journal, quite an excitement has prevailed, both in the Daguerreotype and scientific world. The great question has fairly been solved and "*natural colors*" can be produced and rendered indelible upon the metalic plate. America can safely say she has presented to the world one of the most invaluable discoveries that has ever been imprinted upon the pages of history.

Men profound in their scientific skill and learning, have long and in vain sought for the discovery or invention of some means of securing to the future, the colors of the present. All Europe has been alive to this great desideratum, and many have presumed it an impossibility, while some few persisted, flattered by hope and encouraged by the almost daily announcement of some new discovery or invention, that heretofore had been deemed only as having existence in the dreamy imagination or a perspective future. We hail the discovery of the Hillotype as an epoch bright in the history of science, as well as impregnated with interest to aid in unfolding a volume of investigation which has so long commanded the attention of learned and philosophical minds, as the "*colored rays of light.*"

The subject of reflected light and its colors has long agitated the scientific mind. Much has been said and written; elaborate and laborious "Essays," "Researches" and "Treatises" have penetrated our libraries and proved valuable auxiliaries in pushing the interest of those engaged in furthering agricultural and chemical pursuits. This branch of natural science is regarded as one of the most important, and, at the present moment, it is rendered doubly interesting from the fact of Mr. Hill's discovery. We may look forward for new developements, which will prove no less surprising than that of rendering permanent, on a metalic plate, the variegated beauties of the solar spectrum.

We are, as it were, standing upon an eminence from which we can survey the present, retrospect the past, and almost sketch the bright outline of a coming future. Here lies a field for animated speculation, in which nature's student can satiate his appetite in the study of nature, in a province hitherto unknown and unexplored; he may here realize truths purely sublime, painted in the glowing "colors of nature," and rendered prominent upon the tablet of his memory.

We present the following communication from Mr. HILL, which our readers will peruse with pleasure:

For the Daguerreian Journal.

S. D. HUMPHREY, ESQ.:—Being detained here a day on my way from your city, I relieve myself a little from the tedium of delay, by a few scribblings to your valuable Journal. I will give a few particulars respecting my pictures, &c.

I have now fifty-five specimens. They are all equally perfect. It is quite remarkable that I have never yet made a *partial* failure. Those impressions which have had too much light, are nearly as strong, sound, brilliant and beautiful as those

correctly timed in the camera, being inferior only in having the colors less deep. Even the whites retain their strength. The folds of the linen are *always* well defined. Blue or solarized linen is unknown in my process, and there is always a strength and clearness in the whites, unattainable by mercury. During the past winter I have several times taken a view in which there is a deep red house, while the ground was covered with snow. For experiment I exposed the plate so long as to reduce the bright red of the house to a *very light red*, while at the same time, the white snow was developed with a beautiful whiteness.

I have copied several very highly colored French prints. The copies are far superior to the originals, in that, while they have *every* tint of color, they are exceedingly brilliant. This is a characteristic in which I never fail, even with the plates merely cleaned with rotten stone—the brilliancy depending on *other causes*. Well polished plates, however, are preferable for other reasons. It is *essential* that the plates should be very pure, free from scum, dampness, and organic matter of every kind, and I am experimenting with different substances, in hopes of finding something that will more perfectiy cleanse, while it thoroughly polishes. I would be very thankful to any person who might furnish me with valuable hints on this point, as I am convinced that here lies one great cause of uncertainty.

My trouble with the *yellow*, which you mentioned in the last number of the "Dagurreian Journal," relates only to the homogeneous rays, orange, buff, and all the various shades of yellow come out true except the *chrome yellow* which appears less brilliant. This, however, is thought by distinguished artists, no serious objection.

My late visit to your city was much shorter than I could have wished. I called on a number of Artists, and the cordial manner in which they congratulated me has added much to my kindly feelings towards the fraternity, and strengthened my resolution to give all worthy Daguerreotypists and Artists, my process on terms which I believe will be satisfactory. As far as this is concerned, please say to such their interests are safe in my hands. I met with but one person any way sceptical, and he is willing to be more fully satisfied when he "sees the pictures," which is very fair I am sure. While it is very cheering to me, in my truly arduous duties, to review the kind congratulations of my brother Artists, the most I am entitled to *claim* in an age when almost every announcement is regarded as humbug, is that the Daguerreian world will give me a fair chance to perfect my discovery. A few have seen my pictures, and their expressed opinions agree with mine, viz., that these pictures will astonish the world. I saw in your city, in the hands of Mr. Hite, Artist, some exquisite ivory miniatures. It astonished me that the human hand could paint "the form of the human face divine," in such a mode; but I pleasantly said to the Artist, what I now repeat in all seriousness, that the pictures by my process necessarily exceed in beauty the finest productions of the painter, they being drawn by light and painted by sun-beams.

I have heard several *rumors* while in the city, in respect to my designs in the disposition of my discovery. Allow me to say, for the information of all concerned, that my purpose is *unalterably* fixed to avoid *monopoly*, and to take a course which will put the process into general use.

To-morrow I start for my "mountain home," and with my invigorated health and spirit, I hope to resume my toils with a prospect of bringing out my process at an early day.

I remain,

fraternally yours,

L. L. Hill.

Woodstock, Ulster Co., N. Y.,

March 12, 1851.

☞ We are highly gratified to find many of our fellow Daguerreotypists are cordially welcoming us on by manfully and numerously sending us their names for the Daguerreian Journal for one year. When we commenced our editorial labors we launched our bark upon a sea never before thought safe for regular navigation, but we find only few snags in the way, and these are every day lessened by our close application and the assistance of kind friends. No man knows his friends until they have an opportunity to prove themselves.

With but few exceptions, all who subscribed for the Journal for the first four months have sent us two dollars worth of the "root of all evil," for their subscription for the balance of the year. We *bow*, and *thank you !* May you never get in a "Fog."

☞ T. Antisell, M. D., has been appointed Professor of Chemistry in the Vermont Medical College, at Woodstock, Vt. He is now fulfilling his professional duties at the above named institution.

☞ Mr. J. E. Mayall of London, has promised us an article on "Photographing on Glass." This will appear as soon as received.

☞ Our old and learned friend Mr. Finley of Canandaigua, promised us a communication. Where is it ?

☞ Removal.—In our last we noticed our removal to No. 252 Broadway; this was the case, but we found on consulting a carpenter in relation to putting in a skylight, he declared it unsafe. The consequence was, that we at once abandoned the idea, and soon made very satisfactory arrangements with Mr. Insley, the well and favorably known proprietor of the *Insley Gallery*. Once again we are settled and would be happy to see all who feel an interest in the Daguerreian and Photegenic arts.

The Office of the Daguerreian Journal is at No. 311 *Broadway.*

Our Daguerreotypes.

We are assured by one in whom we have all confidence, and withall capable of judging, that there is now in progress a machine for cleaning and buffing plates. This machine is an ingenious and valuable contrivance, and it is said will polish a plate in one-sixth of the time required by any other process. The whole done without handling the plate. *We hope so.*

Gurney has recently taken some of the finest large size Daguerreotypes ever produced. These wonderful specimens are on plates eleven by thirteen inches, called *mammoth plates.* Such pictures four or five years ago would have filled the world with admiration and surprise. The chemical effect is clear and well worked, thus proving well prepared plates can present large as well as small impressions. It is well worth while for every Daguerreian visiting this city, to look upon these proud specimens of the art.

Thompson of this city, has just taken the whole of the upper floor of the building occupied by him, and has built two fine skylights.

We understand that Mr. H. McBride, operator for Meade & Brother of this city, is about to establish himself in Albany. We wish Mr. B. success.

Weston of this city, is now producing some of the best Calotypes we have seen. We are happy to see Photographing on paper brought before the public. Daguerreotypists should call and see Mr. W's. specimens, as well also those produced by Messrs. Bertha, Wehnest, Beekman & Bro-

thers, who have been for some time past successfully practising in the art of "Sun Drawing."

A. Morand has recently made very extensive additions to his former establishment in Chatham street. We now find him lighting his subjects by a large and well arranged sky-light.

Correspondence.

S. D. Humphrey, Esq.,

Dear Sir:—I would fain give my testimony in favor of your excellent Journal, which is to the Daguerreian, as a guide to the traveller, and pilot to the untaught mariner. It needs but to meet his eye for him to appreciate its value and secure its aid, while following in his misty pathway.

I have long since learned that "experience is the best teacher," but now since the advent of the Journal, all who would be relieved of difficulties incident to Daguerreian life, may find the cause of *atmospheric troubles—bad light—poor subjects—clouded results*, &c., reflected on its pages, and thus, by close application, prevent the many evils which so frequently attend them, and thereby learn that "an ounce of prevention is better than a pound of cure."

But there are those in the business who do not seem to discover any difference between the profile on the school-boy's slate, and the best "aqua-tinta" engraving. *They* never have any trouble in producing *perfect* results at *every* sitting, and *that* for the sum of one dollar or fifty cents. No wonder the writer of the article on Daguerreotypes in No. 5 of the Journal, says "*Daguerreians* are not *artists*, nor Daguerreotypes works of *Art*, but *mere wonders of Nature*."

When Daguerreians adopt the motto—"Good pictures and fair prices," they may lay claim to the enviable name of Artist, and not before. The Daguerreian art is the most difficult art to practise with *perfect* success, that has ever yet been discovered. A *perfect* Daguerreotype is the result of a series of the most careful, delicate and complicated experiments ever conceived of by the human mind.

I have been considerably amused in perusing the Journal, in reading communications from sources where I am acquainted. They remind me of the old adage—"All is not gold that glitters," for they appear to far better advantage in *print*, than as *Artists*. But enough of this. In conclusion, permit me to speak of a method of copying pictures, which, if new to any of your readers, they will find it well worthy of the trial. I find, by placing the picture to be copied where the rays of the sun may fall obliquely upon the plate, all reflection is thrown off, and the image appears in the camera, clear and distinct, even if the original be very faint. It also shortens the time of exposure to from one to five seconds.

Respectfully yours,
Jas. Bennett Sykes.

Owego, March 4, 1851.

Note.—We think this is rather sharp firing, but, as it is already met by the "Artists" referred to, we give it. We do like *spice*, and well seasoned articles, but don't get too personal. A man may have been born in a *stable*, but it is no *sign he is a horse*. We hope the above from Mr. S. was not prompted by "a spirit of rivalry and animosity," but rather for the good of all, as no doubt it will so prove. Give us a *pop* from the other side. [Ed.

Daguerreian Journals Lost.—The following Telgraph Dispatch was received at the Daguerreian Journal Office on the 13th.

"What is the reason of your not sending me my Journals? W. S Gear."

The following was our answer forwarded per mail on the same day.

Daguerreian Journal Office,
New York, March 13th, 1851.

Dear Sir:—Your Telegraph Dispatch came to hand. In answer,—I do send a Journal directed to you as often as published. The last was mailed last Friday, i.e.

the February 15th number, that being the last out. I find it takes nearly as many to furnish the Post Offices as my subscribers; however, I try it again and send one to-day.

Respectfully,
W. S. Gear. S. D. Humphrey.

We wish that the persons wishing the Daguerreian Journal would furnish us with their names—("no questions asked") and they can have a copy forwarded,—thereby our *honest* subscribers would receive their Journal regularly. We do know that we put the Journal in the Post Office—but we don't know *why* so many of our subscribers do not receive them. There is no doubt but that our Journal is valuable, and should be in the hands of all, yet it is with us as with most brother editors, we are unable to furnish copies gratuitously.

AMMONIA.

Ammonia should be a perfectly colorless liquid; when concentrated its specific gravity should be 0·9. It must have a pure ammonial odor, and must volitalise without any residue. It must not become troubled when mixed with alcohol, or lime water, otherwise it contains carbonate of ammonia. Neither must it for the same reason, become troubled when tested with a solution of chloride of barium; this is the best test for carbonate of ammonia. Care is to be taken to observe the action of the test on its first addition, for after the mixture has been exposed to the air for a few minutes, a troubling necessarily ensues, because the ammonia abstracts carbonic acid from the atmosphere.

When super-saturated with nitric acid, and tested with a solution of *nitrate of silver*, it must give no white precipitate; otherwise it contains sal-ammoniac. It must give no precipitate with a solution of chloride of barium, otherwise it contains sulphuric acid, in which case, the precipitate will be invisible in nitric acid. It must give no precipitate with a solution of oxalic acid or superoxalate of potash; otherwise it contains lime. When saturated with nitric acid and tested with a solution of yellow prussiate of potash, it must give no precipitate; otherwise it contains copper. When mixed with its weight of oil of vitriol, it must not become brown or black; otherwise it contains empyreumatic oil. As it is quite difficult to obtain ammonia entirely free from carbonate of ammonia, or to preserve it in that state, the employment of ammonia containing a small portion of the carbonate is admissable in the practice of the Daguerreotype.

An Army of Subscribers.—It is computed that the regular subscribers to the *New York Sun*, standing side by side, and each occupying eighteen inches space, would form a line *seventeen miles, fourteen rods, and three yards long*. Standing with arms extended, and occupying six feet each, they would reach *sixty-eight miles, fifty-eight rods and one yard*, &c. &c.—*Sun*.

Let us see if we also cannot get up some astonishing statistics: The regular subscribers to the *New York Tribune*, standing in single file, each holding fast to the other's coat-tail, would form a line 176 miles, 7 rods and one yard long. Allowing that each could hop, skip and jump the distance of 4 yards, their simultaneous performance of this feat would extend from Cape Horn to Baffins Bay. Supposing they all sneezed at once, the vibration of the air would overthrow the spire of Trinity Church. In reading the 48 columns of our double sheet every morning, the distance travelled by their eyes would reach twice round the earth. There! Is that enough?—*Tribune*.

Wonder if the Tribune's calculations is made from the actual measurement of the "tail" of the "old white coat?" If so its not fair, for Horace has the advantage over the modern fashion.

Strange Announcement.—We see by a Georgia exchange, that some one in that State is taking "Daguerreotypes as low as seventy-five cents." Our Devil says "Barnum is after the *wonder*, and intends having him early this Spring."

EXAMPLES OF THE DIVISIBILITY OF MATTER.

All that has been written in support of what is termed the "Infinite Divisibility of Matter," has been advanced with an oversight of certain axiomatic principles which immediately decide the question in the negative. Indeed, it would suffice to say that there can be no such thing as a division of matter into an infinite number of parts simply because there can be no such thing as an infinite number of any thing. Number is essentially finite, and although, in imagination, it can be extended indefinitely, it never can be positively infinite, at any period of futurity, from the very fact that we can always conceive of its being extended still farther. Even as an ideal extension of parts, it has always a beginning and an end, at any given time we may asume for measuring it, and is, therefore, never infinite in itself at any time. In this respect it differs essentially from infinite space, which having no parts, is positively infinite at all times. Number is a convenient instrument wherewith to obtain an idea of infinite space, or of infinite duration, on account of its capacity for endless extension or continuation; and it is because we can ideally extend and continue it forever, without even approximating to a measurement of space and duration, that we discover the latter to be absolutely infinite, and number to be absolutely finite. We discover that between the capacity for endless extension and endless extension itself, there is a manifest and decided difference. Under any circumstances, therefore, the term infinite, as applied to the divisibility of matter, is unphilosophical and improper. All the matter in the universe is finite, and if it were to be doubled, or quatrilliontupled, every instant of time, to all eternity, it would never become infinitely extended. And, by the same rule, it can never become infinitely subdivided.

If, however, by the term "infinite divisibility," as applied to matter, is merely meant its capacity for interminable subdivision, then the question resolves itself either into one of speculative fancy or of practical fact. If the former, then it must be admitted that, by an effort of the imagination, we can conceive of such a divisibility beyond any assignable limits. But if we regard the question as a practical one, it immediately becomes too absurd for serious attention, since it is evident that human power, limited in all things, must be so in producing artificial subdivisions of matter. However unlimited, therefore, the capacity of matter may be for divisibility, that of human beings, in relation to it, must be narrow indeed. When chemists, therefore, and other philosophers, speak of the divisibility of the present ultimate atoms of matter, they must, however unconsciously, regard them in relation to human ability, and thus far the question may become one of experiment. But the question as to whether matter can actually be subdivided indefinitely and without end, is one readily answered in the negative, by the known inability of mankind to continue an endless experiment of this kind. The whole question therefore, concerning the illimitable divisibility of matter, which has been discussed from the earliest period of science to the present day, is frivolous, fruitless, and irrational.

As matter now exists, not only its ultimate atoms, but even its constituent molecules, are as inconceivably minute, as its aggregations are vast. Taking an exemplification, from organic matter, we find that a single drop of a strong solution of indigo, in which at least 500,000 parts are rendered distinctly visible by the microscope, colors 1,000 cubic inches of water, and as this quantity of water is at least half a million of times greater than the drop of indigo solution, the particles of indigo must be smaller than 2,500,000,000,000, the twenty-five hundred millionth part of a cubic inch. If we dissolve a particle

of silver, of 0.01 of a cubic *line*, in size, in nitric acid, it will render distinctly milky 500 cubic inches of a clear solution of common salt; and, consequently, the magnitude of each particle of silver thus divided and diffused, must be somewhat less than the billionth part of a cubic *line!* So great a number as a billion being but imperfectly conceivable, it may render the idea of this minute division more distinct, by stating that to count a single billion of seconds, by a watch, every day and night without ceasing, would require 31,675 years. In gilding silver wire, it is found, by calculation, that a grain of gold is spread over 1,400 square inches; and as, when examined by a microscope, the gold upon the thousandth part of a linear inch is distinctly visible, it is demonstrated that gold may be divided into particles of at least the billionth, 400 millionth, of a square inch in size, and retain the color and all other characteristics of a California prize. If a grain of copper be dissolved in nitric acid, and then in water of ammonia, it will give a decidedly violet color to 392 cubic inches of water; and, therefore, if there was but one particle of copper in each portion of the water of the size of a grain of sand, of which one million make a cubic inch, it would show that the original grain of copper had become divided into 392 particles.

This extreme tenuity of matter, however, is far surpassed in some examples which may be adduced from organic sources. It is upon authentic record that an Irish girl has spun linen yarn, of which one pound was 1,432 English miles in length, and of which, therefore, 17 pounds and 13 ounces would have girt this world; and yet less than the 127 millionth part of this thread would have been distinctly visible, and must have contained other filiaments still finer, each of which must have been composed of an indefinite number of smaller particles, themselves, in all probability of complex organization, and containing certainly, minuter atoms of carbon, besides those of gaseous matter.

If we employ the microscope, far greater wonders of divisibility than these appear, even in the complex organization of animal life. Ehrenberg has shown that tripoli, a mineral much used in the arts, is entirely composed of the siliceous shells of the microscopic animalcula, known as infusiorials, and that a single cubic inch of it contains at least *forty-one thousand millions* of these shells!—about fifty times as many individuals as there are of human beings on the globe. Yet each of these minute animals lived and fed; had digestive and circulative systems, with blood possessing globules as large, probably, in proportion, as those of ours, besides nerves of sensation and inclination, with brains belonglng to them, together with muscles and every other mechanical apparatus for the extremely active locomotion and propagation which they so interestingly exhibit. And every new improvement in the microscope reveals new races of animals, apparently created for their own enjoyment, and of which millions heaped on millions, would be utterly invisible to the unaided eye.—These facts prove that things are great and small only by comparison with each other, and not in relation to infinity, with which no comparison can be instituted. And they prove, moreover, that vain, boastful, and bigoted man, is not the sole object of creation, nor of the profound benevolence, contrivance and design, with which it is universally replete.—*Art's Echo.*

IRON—ITS NATURAL AND ARTIFICIAL COMBINATIONS WITH CARBON.

The question is often asked, what constitutes the difference between wrought iron, cast iron and steel?

Cast Iron, when viewed under favorable circumstances, by the help of a microscope will be found to be a mechanical aggrega-

tion of molecules of *iron and carbon;* and the relative position of these particles may be illustrated by a pile of cannon balls as usually arranged in navy yards, each alternate ball being iron and carbon (charcoal.)

If a mass of cast iron be heated until softened, and then *puddled* (squeezed,) the carbon will be forced to the surface, and will there combine with the oxygen of the atmosphere, forming carbonic acid or carbonic oxide gases, and thus pass off. When all the carbon has been parted with, the mass is called Wrought Iron, and may then be welded, when at proper heat, but cannot be melted—*the hottest blast furnace will not melt wrought iron.* Wrought iron at red heat combines rapidly with oxygen, and becomes oxide of iron—thus a joint of stove-pipe thrown into a furnace will never melt, but by contact with atmosphere will change into oxide of iron, and thus be practically lost. This operation is technically called *burning*. If a piece of wrought iron be surrounded by carbon (charcoal) finely pulverized, and the whole enclosed in a sheet iron vessel to exclude the air, and this placed for a sufficient length of time in a furnace constructed for the purpose, the iron will imbibe an atomic quantity of carbon, and become Steel. This process is called *cementation*, and steel so made can be melted as readily as cast iron.

Thus it will be seen that both cast iron and steel are combinations of iron and carbon, and in the same proportions, but not in the same state of combination. In cast iron, the carbon and iron are a mere *mechanical combination.* while in steel the iron and carbon are combined *chemically.*—Wrought iron, when pure, is free from carbon, and its ductility, toughness, &c., are due to the absence of carbon, sulphur, phosphorus, and other substances, with which it is occasionally pervaded.

The French chemists are experimenting, and occasionally succeeding by accident, in causing heated iron to take the carbon from carbonic acid and other gases containing carbon, and thus becoming steel more rapidly, and at less cost, than when made by the process of cementation. Mr. Dixon, of Jersey City, has succeeded in making steel direct from the Adirondak iron ore, while Peter Cooper, Esq., Mr. Dickinson, and others, are manufacturing wrought iron direct from the iron ores of New-Jersey without first forming the pig or cast iron, and of course at less expense, as the saving of fuel is very great.

The process of *case-hardening*, or changing the immediate surface of iron utensils into steel, is readily performed by covering their surfaces with such organic substances as contain carbon as a constituent, and then subjecting them to high heat for short spaces of time—thus the roller of a paper or sugar mill may be case-hardened by a coating of prussiate of potash, or of leather chips, and then subject the whole to high heat, excluded from atmospheric influences. By this process the gelatine and other constituents of the leather are reduced to carbon, and this enters the surface particles of the iron, converting them into steel. Many hypotheses are offered for this action, and among others, that "*the ultimate particles of matter are always in motion,*" admitting the ingress of particles travelling in smaller orbits between them. The friends of this hypothesis offer as proof, that a fresh cast sash-weight when broken is a gray mass, while one taken from an old building, and broken, is beautifully chrystaline, from the centre to the outside, like speculum metal. A freshly drawn piece of tin pipe when suddenly bent opposite the ear gives no crackling sound, and if broken has no chrystaline structure, but if left at rest for one hour it has both. Barbers often tell us that razors get tired of shaving, but if laid by for thirty days they will then shave well. By microscopic examination it is found that the *tired razor*, from long stropping by the same hand and in the same directions, has the ultimate particles or fibres of its sur-

face or edge all arranged in one direction, like the edge of a piece of cut velvet; but after a month's rest, these fibres re-arrange themselves heterogeneously, crossing each other and presenting a saw-like edge, each fibre supporting its fellow, and hence cutting the beard, instead of being forced down flat without cutting, as when laid by. These and many other instances are offered by the friends of the hypothesis named, to prove that the ultimate particles of matter are always in motion, and they say that in the process of welding, the absolute momentum of the hammer causes an entanglement of orbits of motion, and hence a re-arrangement, as in one piece; indeed, in the cold state, a leaf of gold laid on a polished surface of steel, and stricken smartly with a hammer, will have its particles forced into the steel so as to permanently gild it at the point of contact.

The oxidation of metals is equally curious, and the length of time necessary for the formation of an infinitesimal coating of oxide is less than the one-thousandth of a second. This fact may be readily proved: a clean surface of steel, free from oxide, when brought in contact with mercury (quicksilver) will amalgamate, but if the least oxide be upon the surface no such effect will take place. Prepare a trough containing quicksilver, and place a bar of steel above it, and within one inch or less of the surface of the quicksilver—break this bar with a smart blow from a hammer, so that the blow which breaks it shall at the same time force the broken ends into the quicksilver, and although the time occupied by the ends in passing through one inch of atmosphere before reaching the surface of the quicksilver will be immeasurably short, still they will be so oxidized as not to amalgamate with the mercury; if, however, the bar of steel be confined at its ends below the surface of the quicksilver, and then be broken *upwards*, by a lever applied to its centre, the ends of the broken bar will be beautifully amalgamated before reaching the atmosphere above. The reason for the success of the last named experiment is doubtless due to the absence of oxide of iron, when broken beneath the surface of the mercury. J. J. MAPES.

NEW WEIGH-LOCK AT ALBANY.—A writer in the *Courier and Enquirer* gives a desceiption of the great weigh-lock that has just been erected at Albany, for the purpose of ascertaining the tonnage of canal boats.

Heretofore long and vexatious delays have been the result, while now, a boat is brought into the lock, and in a time which would have scarcely sufficed in other days to have ascertained the weight of a small parcel, the unerring register on the beam has registered its weight, and the record is on the books of the office. The weigh-lock is directly on the side of, and attached to the large canal, and is adapted to the use of such boats as shall hereafter be built, when the locks throughout the entire length of the canal shall be of the uniform enlarged size.

DAGUERREOTYPING IN LONDON.—In a recent letter from J. E. Mayall, dated London, February 11th, he writes in his postscript:—"While I write this letter we have the gas lighted in the streets — 1 o'clock P.M., and I write by gas-light."

We must confess that the Daguerreotypists are in the "Fog" enough in this country, but if "Old Sol" should get blocked up at that early hour, we don't know what would become of our "Foggy" Daguerreotypists here.

The ground side of the "Ground Glass" should face the lenses.

Mercury baths should always be kept covered with some porous wood, in order that the mercurial vapors cannot escape in the room.

QUICK STUFFS.

We have endeavored to guard against giving useless receipts, thereby saving our Daguerreotypes a tax which would prove in most instances of no benefit. As many have requested us to publish a variety of receipts for Quicks. We give them with but little comment. We will number each combination:

No. 1. Take pure rain or distilled water, one quart filtered through paper into a bottle having a ground glass stopper, and add one and a half ounces of chloride of iodine for warm weather, or little less for cold weather. The reason of this is obvious, from the fact that during the warm summer day, the bromine is far more volatile than in a winter day. To the above add one ounce of best American bromine, and shake well. Now, with care, to prevent, as far as possible, the escape of gas, add, drop by drop, thirty drops of aqua ammonia, shaking well the mixture at each drop.

It is necessary that caution be observed, and not add more at a time than *three* drops of the aqua ammonia, as otherwise it evolves too much heat.

Use. Put in the box one part quick to eight parts water. Coat to dark yellow over dry iodine, and change to a deep rosed color over the Quick; recoat over iodine one-tenth.

No. 2. Lime water, one quart; chloride iodine, one ounce; add three-fourths of an ounce of bromine—shake well.

Use. Put in box one part quick to six water; coat to bright yellow over iodine; to rose over the quick, and recoat one-fourth.

No. 3. Take rain or distilled water, one quart; add pulverized alum until it is a little sour to the taste; and a small piece, say one half inch square, of magnesia,—Filter through paper, and add chloride of iodine, one half ounce; bromine sufficient to take it up, which is a little less than half an ounce.

Use. One part quick to six parts water; coat over iodine to a soft yellow, nearly, but not quite bordering on a rose; over the quick to a dark purple or steel; recoat from one-sixth to one-tenth.

The above works slow, but with a good light and proper management it can be made to produce as good impression as any combination known, yet it is not so easily managed as No. 1.

No. 4. Rain or distilled water, one gallon; bromine, one and a half drachm; sulphuric acid, two and a half drachms; hydrochloric acid;* two drachms.—Shake well as each is added in the above order.

Use. To one ounce water, add from fifteen to thirty drops quick; coat over an incipient rose; over quick, nearly change the color to fair rose; recoat about one-third or one-fourth as long as at first coating. The coating box should be charged strong enough to change the plate in from *one* to *four seconds*. One advantage this mixture possesses, it will work in one-half the time required for any of the foregoing combinations. One very serious objection to its use is, it cannot, without great care, be made to work with certainty; and another objection is, it will not last long, as the box will require to be replenished after having coated from *eight* to *fourteen* plates. The older, however, this mixture is, the more certain in its operation. We have one gallon which has been made *two years*.

No. 5. *Dry Quick.* We have already given this preparation in a former number of this Journal.

No. 6. *Acidulated Quick.* Water, one

* This acid dissolves glass with great rapidity. It is purchased in leaden bottles. A single drop on the skin would make a sore difficult to heal. Daguerreotypists should bear in mind that the accelerating chemicals used in the Daguerreian art, are of the most volatile substance, and more difficult to experiment with than all other in the range of chemical science. When hydrofluric acid is to be measured, the graduated glass should be partly filled with the mixture to which you intend adding it.

pint: bromine, ten drops; chloride of iodine, forty drops; nitro-muriatic acid, one-fourth ounce; sulphuric acid, two drops.

Use. One part quick to ten parts water; coat over iodine to orange; over quick to rose red; recoat one-fourth.

There are thousands of different combinations and agents employed, and, after all, let every Daguerreian make up his mind to first *become acquainted* with some *good* combination of bromine and iodine, there will be less complaining of *Quicks*.

Money received since our last Number.

W. A.; M. R.; F. S. H.; J. W. O.; S. B. D.; H. O. N.; T. O.; J. H. F.; S. B. B.; M. P. B.; A. B.; J. H. V.; W. A. J.; J. E. M.; M. M.; H. H. L.; J. W. H.; S. N. R.; N. E. S.; R. B. A.; H. S. B.; D. C.; T. C. D.; C. H. G.—each $2. G. & B.; D. McD.; S. P.; M. S. U.; C. T. M.; S. S.; W. R. R.; S. B. jr.; E. N. H.; C. W. T.; J. M.; S. H.; N. C.; C. M. H.; J. B.; J. B. R.; W. O. G.; N. P. S.; L. O.; A. T.; W. S. W.; N. E. R.; D. G. K.; L. Q. V.; H. K.; Y. M.; A. G.; U. B.; D. A. N.; V. T.; W. O. O. V.—each $3. S. B. & CO.; M. & B.; P. C.; T. C. D.; S. & S.; H. & M.; M. W. N.; G. D. A.; J. S.; A. T. W.; M. A. H.—each $5. N. E. S.: T. C. D.—each $10. M. S. $15. B. F. $34.

ANSWERS TO CORRESPONDENTS.

W. O. R., Mo., Mr. R. writes—"Will you have the kindness to inform me of any new process for preparing phosphate of iron. I make the request more particularly to obtain a process by one Mr. Routh, who I understand has a new process."

The preparation referred to by Mr. R., was read before the London Medical Society, January 11, 1851, by Dr. Routh, at which time he exhibited specimens of phosphate of iron made by dissolving the ordinary phosphate in meta-phosphoric acid, and by then evaporating to degrees. It has been found that this form of iron is exceedingly useful in cases where iron is desired.

W. B. N., Mexico.—Mr. N. says—"Will some of your subscribers give, through your Journal, a practical and first-rate process for producing Calotypes?"

We hope some of our "subscribers" will furnish the same.

H. B. T., Ohio.—Mr. T. says—"Will you give a ready and easy method of detecting chlorine? I find in a former number of your valuable Journal, that you have been making experiments with this gas. I have had remarkable success with this gas, although not a practical Daguerreotypist."

Mr. J. will find 'this gas' is readily distinguished from other gases by its color, odor, and bleaching properties. Probably the most simple method of detecting free chloride is to hold a rod dipped in aqua ammonia over it, when white fumes will be formed.

Will Mr. J. have the kindness to forward to us his experiments; we would like much to lay them before our readers.

A Stock Dealer, in one of the Southern States, writes—"What articles of stock will be less needed by artists, provided Mr. Hill's process proves true, of producing pictures with all the 'colors of nature?'"

Colors and brushes!

J. W. S, Mich.—We forwarded the article you ordered, and enclosed the balance in the package. The view camera you had better order soon, as it will be some time before Mr. Harrison can get it ready, he having so many orders now on hand. You had better have one of Lewis's *new* Camera boxes.

T. J. C., Va.—We cannot recommend the articles you speak of; they involve only an old vague principle, and are only worthy the person having them in charge.

A. G. L., Pa.—The money received and forwarded to Europe; your plan may work, but it looks a little too "opaque." You will find by heating an iron plate, and applying it to your apparatus, will facilitate the operation much. Chapman has the exclusive right to the patent.

E. W., Miss.---See page 24, Daguerreian Journal.

R. M. H., Ala.—You will find "Silliman's Journal" a great aid and valuable work, "published the first day of every second month, price $5 per year. New Haven, Conn.

See answer to L. I. G., page 187.

NOTICE OF NEW PUBLICATION.

The New York Register of Medicine and Pharmacy, published semi-monthly and edited by Dr. C. D. Griswold.

This valuable Medical Journal is fast making its way into the medical ranks with marked energy. Its age is about the same as ours, and we are happy to see that with us it is prosperous; every number is received and

read with pleasure. We find the following pithy notice in the Register, which is only one of many from the cute pen of the Editor, who it seems has 'cut up' as well as received a "New Dido." "We were presented with the first number of the "New Dido" by the publisher, and from the title, at first supposed that it might be in some way connected with the medical profession, inasmuch as some 'pranks' in a medical way have been 'cut up' in poetry, but in looking it over, we find that a couple of 'chaps' have started off for a drive, although what they are 'driving at,' the author has not yet disclosed. We think it likely enough they may "turn out" students, for they are evidently after *subjects*, which no doubt will be brought to *light* in the next number."—Good, Dr., that is worth the Dollar for the subscription.

We have also received the 15th of March number, which has a fine likeness of Dr. John W. Francis.

DAGUERREIAN ARTISTS' REGISTER.

Appleby, R. B., 14 Arcade, Rochester, N. Y.
Anthony, J. B., Poplar Grove, S. C.
Adams, George, Worcester, Mass.
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VOL. II. JUNE 1, 1851. NO. 2.

THE

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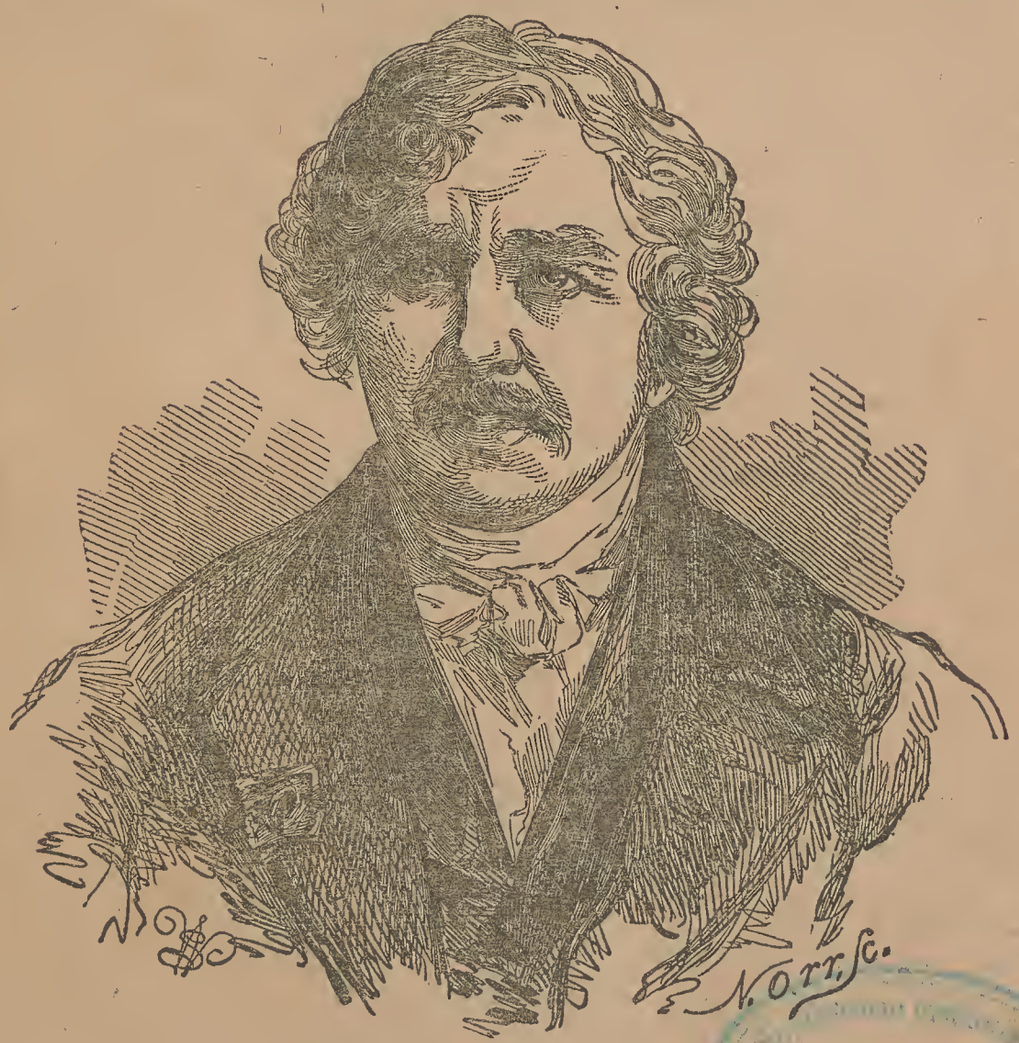

Daguerre

S. D. HUMPHREY AND L. L. HILL, EDITORS.

NEW YORK:

PUBLISHED SEMI-MONTHLY BY S. D. HUMPHREY,

NO. 311 BROADWAY, INSLEY'S GALLERY.

SUBJECT TO NEWSPAPER POSTAGE ONLY.

CONTENTS.

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THE

DAGUERREIAN JOURNAL.

VOL. II. NEW YORK, JUNE 1, 1851. No. 2.

SOME EXPERIMENTS AND REMARKS

ON THE CHANGES WHICH BODIES ARE CAPABLE OF UNDERGOING IN DARKNESS, AND ON THE AGENT PRODUCING THESE CHANGES.

BY ROBERT HUNT.

[Concluded.]

With the view of testing Dr. Draper's results, I carefully iodized two silver plates and exposed them to light. I then placed them so that half of one plate was covered by half of the other, and allowed them to remain in the dark 1-24th of an inch apart for four hours. On mercurialization I could not detect the slightest difference between the covered and uncovered portions of either of the plates.

Another silver plate was iodized and exposed to light. It was then placed in the dark with a sensitive plate which had been carefully kept from the light, 1-16th of an inch above it, and a small engraving placed between them. They were allowed to remain thus for six hours. When exposed to the vapor of mercury, the plate which had been subjected to the light whitened all over, and the space occupied by the engraving was distinctly marked by lines of vapor thicker than the other parts. The plate which had been preserved in the dark was scarcely at all influenced by the vapor, except on those parts which had been touched by the supports of card-board on which it rested. These were so arranged that no radiation could have influenced those parts of the plates.

An iodized silver plate was placed in the dark with a little fine string coiled over parts of it, and a polished silver plate supported 1-8th of an inch above it. After four hours both plates were subjected to mercurial vapor. On the iodized plate the deposit of vapor was uniform, although slight; but on the superposed plate of silver a strong and beautiful image of the string on the under plate became visible. I found that neither of the two iodized plates had lost their sensitiveness by the operations to which they had been subjected in the dark.

Hoping to detect some evidence of the process by which these singular results were produced, I instituted a series of experiments, of which the following are some of the most interesting results.

A. A silver plate was iodized, a piece of card was placed upon it, and a well-polished mercurial plate (amalgamated copper) was suspended 1-8th of an inch above it, and left in this state for a night. The space on the silver plate corresponding with the mercurial plate, except under the card, was nearly freed of its iodine, which had evidently combined with the mercury on the upper plate. On exposing the mercu-

rial plate to the vapor of mercury the image of the card was rendered visible, the vapor covering every part of the plate except that opposite the card. The silver plate received the vapor only on those parts which were not influenced by the mercurial plate. The upper plate was suspended by strings; these were faithfully imaged on both plates; by a thick line of mercurial vapor on the under plate, by the absence of it in the upper one.

B. An iodized *silvered* plate was exposed to light until brown, and a mercurial plate suspended above it for twelve hours. The browned silver plate was *whitened*, and all the irregularities of the mercurial plate strikingly marked on it: the mercurial plate was slightly tarnished. On rubbing the silvered plate it was found that the silver was removed more readily over the whitened portion, but had lost none of its adhesion in other parts.

C. Over an iodized silver plate, plates of gold, platina, silver, brass, copper, copper amalgamated, and zinc were placed at the distance of 1-8th of an inch. After three hours the amalgamated plate had made a decidedly visible impression on the silver one. On exposure to vapor, the mercury lodged on every part of the plate except that affected by the mercurial plate; some irregularities were observed, but none which could be decidedly traced to the other metals in juxtaposition. I have some evidence that different metals near each other seriously interfere with each other's influence.

D. A mercurial plate was iodized, and another mercurial plate placed 1-8th of an inch above it. The upper plate became covered with a bright yellow film; and on exposing them to mercurial vapor, marks became apparent which corresponded with those in the opposite plate.

E. A silver plate was iodized and placed in the dark with an engraving, face down, upon it. An amalgamated copper plate was laid on this, and left for fifteen hours. The mercurial plate was reddened, and on exposure to the vapor of mercury, a very nice impression of the engraving was brought out, it having been effected through the thickness of the paper. On the silvered plate the space covered by the paper was well marked; but vaporization produced no trace of the engraving. The space beyond the paper was rendered white. It was curious that both plates had several spots which corresponded, particularly two, distinguished by a well-defined circle and a comet-like appendage, in length ten times the diameter of the circle. These spots could not be traced to anything visible in the print or either of the plates, and must, I think, be referred to some electrical influence. I find it indeed commonly the case, that the plates, after being subjected to these kind of experiments a few times, become mottled, or present on their polished faces all the appearances of a finely-grained wood, and in this state they are less susceptible of receiving any impression than when not so.

F. A silver plate was iodized and placed upon an engraving laid on a brightly polished mercurial plate, and left in the dark for twenty-four hours. The mercurial plate was turned brown, and the silver plate was left in the same state as if it had been exposed to sunshine, being *brown and black.* Neither of these plates gave a copy of the picture.

G. A mercurial plate was iodized, and above it was placed a plate of polished iron, a disc of paper being first laid on the mercurial plate, and they were left in this state for some hours. On exposing the iron plate to mercurial vapor, it was abundantly lodged over that space opposite the paper disc, but not at all on the other parts. The mercurial plate was attacked by vapor over every part but that which the paper disc protected.

Lead and zinc plates were used instead of the iron one, with nearly similar results.

H. A Daguerreo'ype was taken, and without removing the iodine a mercurial

plate was placed a little above it, and left for ten hours. When removed, well-defined traces of the Daguerreotype picture were evident on the mercurial plate, which leads me to hope that by careful manipulation we may succeed in multiplying these beautiful productions by an easy method.

I became desirous of ascertaining whether the mercurial plates would produce any change upon the precipitated iodide of silver. I find by many experiments, that if the iodide of silver is pure, no more change is produced than is produced upon it by diffused light; but if it is rendered sensitive by a trace of the nitrate of silver, it is then darkened as by solar influence.

Sensitive iodide of silver being placed upon a plate of glass, a mercurial plate was fixed 1-8th of an inch above it. In three days the iodide of silver had become a deep brown, almost a black, and the mercurial plate was covered with the yellow iodide of mercury. Nitric acid dissolved the dark portion of the silver salt, as did also ammonia, on which was formed Faraday's oxide of silver, thereby proving the change, either by a primary or a secondary process, of the iodide into the oxide of silver. This experiment has been repeated at least a dozen times, and always with the same results. If a little heap of the iodide of silver is placed under a mercurial plate, it is exceedingly interesting to witness the gradual formation of the very beautiful colored rings on the mercury in the progress of its conversion into an iodide. By prolonged action the yellow iodide passes into the bright red biniodide of mercury. I have some experiments now in hand, which convince me that similar chemical changes are to be effected through considerable spaces. I have succeeded in decomposing the iodide of copper and the iodide of gold by mercurial plates placed nearly a quarter of an inch above them.

I have an extensive record of results similar to those I have now detailed, all of them showing that the changes brought about by this mysterious agent, whether it be heat, light, or an undiscovered element, cannot be referred to those rays which the admirable researches of Sir John Herschel have shown to be the operative ones in producing the photographic phenomena which have so interested the world by their novel beauty, and which professor Draper includes within his general term—tithonicity. With regard to the detithonizing influence of the gases mentioned by Dr. Draper in his paper in your March number, I can only consider the results, which I find to be as he has stated, as the simple reconversion of the decomposed iodide of silver into another definite chemical compound. An iodized plate is exposed to light, the iodide of silver or other sensitive salt is decomposed, and in a state to receive mercurial vapor. It is now passed through an atmosphere of iodine, of chlorine, of bromine, or of nitrous gas. Chemists are well aware of the surprising energy with which these bodies attack the metals, consequently the exposure of a moment is quite sufficient to convert the surface which has undergone a change, into an iodide, chloride, bromite, or nitrite of silver. I certainly cannot see the necessity of going so far out of our way for an explanation of this effect as Dr. Draper has done.

I fear I have already occupied too much of your valuable space, or I might be inclined to trespass further. I shall, however drop my pen for the present, again assuring you that I only desire to keep the image of Truth which is just shadowing our path, as free as possible from mists which might in any way obscure it.—*Philosophical Magazine*, 1843.

RAILROAD TO THE PACIFIC.—Forest Shepherd, of Sacramento City, says it is now ascertained almost beyond doubt, that a railroad can be constructed from the Mississippi to the Pacific, without crossing any mountains, or meeting more impediment from snow than between Albany and Boston.

EXPERIMENTS ON THE COLORED FILMS

FORMED BY IODINE, BROMINE, AND CHLORINE UPON VARIOUS METALS.

BY AUGUSTUS WALLER, M. D.

In a paper presented by me to the Academy of Sciences of Paris, an extract from which may be seen in the *Comptes Rendus* for October 5, 1840, I first demonstrated the error committed in ascribing to the iodide of silver alone the power of fixing the vapors of mercury, after it had been exposed to the action of light. Instead of this property being exclusively confined to a film of iodide of silver, as obtained in the process of M. Daguerre, I found that it existed in many other substances when presented to the action of light in the state of thin films, viz. by the bromide and chloride of silver; by the oxide, bromide, iodide and chloride of copper, and some others; all these, however, possessing less sensibility than the iodide of silver of Daguerre, and therefore less available for the reproduction of the images of the camera than the compound originally discovered by that gentleman. The iodide of Daguerre was found already too little sensitive to the influence of light in this climate, especially when applied to the reproduction of the image of animate objects, so that those films discovered by me seemed still less suitable to be employed for that purpose; this objection has, however, been completely removed by recent improvements, more particularly those of M. Claudet, who effected this principally by combining the original discovery of Daguerre with those mentioned above as having been subsequently made by myself. Pursuing the first stage of Daguerre's process, he obtained the film of iodide of silver, and added to this another film of bromide, either in a simple state, —as practised in my experiments published more than six months before—or after two of these substances had been combined together, as the chloride of iodine and the bromide of iodine, which he was the first to employ.

These colored films, however, merit attention independently of the purposes to which they may be applied in photography: the beauty of some of the phenomena themselves is peculiarly attractive; the numerous changes of color they undergo, either by a variation in the thickness of the film, or by the action of light, assign them a place among the most curious facts of science, and the extreme facility with which they are obtained adds to the interest they excite.

Impressed with these ideas, I was induced to pursue a train of investigation on this subject; among the results of which, one of the most interesting was a new method of making colored rings, like those generally known under the name of "Newton's colored rings," on many of the metals, by the same chemical process as that employed for forming the films of uniform thickness in photography. In order to procure these colored rings, and at the same time to show the identity of the origin of the colors with those of the ordinary transparent films, that is, as residing simply in the thickness of the lamina and not dependent on the ordinary cause of color, we have but to place a piece of iodine on a well-polished surface of silver or copper, and in a short time we find around the iodine a series of colored zones of the various tints of the spectrum, and approaching in a greater or less degree to the form of a circle, according as they have been more or less disturbed in their formation by currents of the surrounding air. In order that they may be perfectly regular, as large as possible, and with tints undisturbed by the action of light, it is necessary to place a piece of iodine in the centre of a well-polished plate, as before described; this is then to be shaded by an opake screen superimposed a few lines from the surface to cause the vapors which would otherwise ascend and partially escape, to

expand over its silver surface. Colored rings may be formed in the same manner by bromine and chlorine and the various combinations of these bodies with each other, except that for those that are gaseous or liquid it is requisite to pay a little attention to the manner of disengaging them on the surface of the metal, either by passing them through a glass tube, or by some other contrivance easy to execute.

These rings correspond to those formed by reflected light in Newton's experiments, with this difference, however, that in the colored films of the soap bubble, and in those formed by the glass lenses, the thinest film is in the centre; whilst in these rings, obtained by chemical action, it exists at the circumference, as is the case with the colored rings of Nobili. In watching the formation of these phænomena, at first are seen two or three very small circles, which appear almost as soon as the iodine and the metal are placed in contact with each other; as the experiment continues, the circumference of these circles become gradually greater; whilst the external colors extend themselves over a great space, those of the centre grow fainter; red and green now only remain visible, and these at last, when the film has attained a certain thickness, in their turn also give place to a dull coating of brown.

The formation of these rings evidently depends on the vaporization of the iodine from the solid nucleus. The variety in color and extent of these zones is caused by the difference between the strength of the vapor at the centre and the circumference of the iodic atmosphere whilst expanding over so large a surface. In the metal thus combining with the vapor, we have to consider,—1, the force of the vapor of different distances from the centre; 2, the obstacle which a film of iodine, once formed, opposes to any further action between the iodine and the metal.

This experiment may be varied in differten ways: two pieces of iodine of about the same size, placed at a small distance from each other on a silver plate, form separate colored circles, until these come in contact at their circumferences, when the two systems will slowly coalesce and produce one common outline of the form of an ellipsis.

As the colors formed on various metals by the above-mentioned agents are very similar to one another, it may be sufficient to examine in particular those produced on silver by iodine.

The external film of the iodide of silver rings, which corresponds to the central black spot in those of Newton, is completely invisible, it being impossible to perceive any difference between the parts so covered and those where the metal is intact; but by exposing half the plate to the influence of light, whilst the other part remains covered, the silver is then found darkened far beyond the limits of the external gold-colored zone, where previously the surface was perfectly clear. The dark film thus rendered apparent is now liable to be rubbed off by the slightest friction, whereas before it was very adherent to the subjacent surface. The first zone is of a pale gold color, which assumes a deeper tint as the thickness of the film increases: the second zone is blue, the third white: after these appear the different colors of the spectrum in regular succession, as in the films studied by Newton and others, viz. yellow, orange, red, blue green, yellow &c.

The presence of the golden-colored zone in the place mentioned is worthy of remark, as in the tables of Newton of the colors presented by films of various thicknesses, the blue is stated as immediately following the black. The same gold film is the first which appears on most metals when their surface is attacked in this manner. Chlorine and bromine on silver; oxygen on steel; chlorine and bromine on titanium, bismuth, &c., commence their colors in the same way. Copper, however, is in one respect an exception, this metal first

becoming of a dark red, which increases to a ruddy brown and then changes into blue. This deviation is fully accounted for by the color of the copper itself. With this single particularity, this metal undergoes the same alterations as the others.

The action of light on the different colors of the iodide of silver is very interesting: the most correct way of studying this is to protect one half of a system of colored rings by an opake screen, while the other half is exposed for a short time to the influence of the solar rays. The golden zone undergoes the greatest change; at first it grows darker, then red, and at length is converted into a beautiful green. The blue film, which comes next in thickness, suffers considerable alteration in its tint, assuming a much deeper and more brilliant shade; the rest of the colors appear to be similarly affected by the action of light, though to a very slight degree, acquiring a trifling accession in their brilliancy. It has already been remarked that light destroys the adherence of the external invisible film; the same thing obtains with the second or gold-colored film, which turns green, *but only to a certain depth* of the film, as may be proved by slightly rubbing the part thus altered; the green color is then seen to disappear, and beneath the pulverulent portion thus removed is found the gold color, having almost the same appearance as before the plate had been exposed. As this experiment may be repeated several times with the same results, it shows to how inconceivably small a depth the light has acted to produce this effect.

To ascertain what would take place on augmenting the thickness of the portion turned green, and the adherence of which was destroyed, a piece of iodine was placed on the plate so that its vapor, by expanding, might arrive upon the green, at the same time the whole being kept from the light; the result was that the additional film combined with the one already existing, producing a blue, being the color which would have resulted by the combination of the unaltered yellow films. I have found no chemical substance possessing the power of arresting, or in any way influencing these changes of color; strong acids, provided they do not attack the silver--for then, of course, the experiment would be destroyed,—and alkalies in concentrated solution, allow the action of light to go on as usual. The hyposulphate of soda, and ammonia in solution have no longer the power of dissolving the green film as they had before the action of light.

When the plate is left still longer exposed, after the changes above stated have taken place, the colors become more faint, and within the zone of green a white cloudy film is caused by the light, which, as it increases, veils the spectral colors beneath.

The knowledge we at present possees in chemistry of the affinities with which different bodies are endowed for combining with each other is but very imperfect, and the causes which complicate most chemical phenomena are so numerous, that it is scarcely possible to compare any two chemical actions to each other. Most of the facts upon which chemical science is founded, are acquired either by bringing the two bodies destined to act on each other into contact by dissolving them in a liquid, or by subjecting them to a temperature more or less elevated.

In the first of these methods, we are so far from being able to calculate the force of the chemical powers called into play, that Berthollet was induced to deny the existence of chemical power in the various phenomena of solution and precipitation of saline substances, and according to him what is called insolubility in a body is merely the result of its strength of cohesion, an entirely physical property.

When the intervention of caloric is required, the effects are still more complicated, as they vary according to the intensity of the heat employed, and the time its action is exerted; besides, the chemical action,

when it does take place, is frequently so instantaneous that it is impossible in our present state of science to imagine any means by which it might be measured. In the combination of the three bodies, iodine, bromine and chlorine, with the metals, however, most of these objections cease to exist, or may be easily avoided. As their vapors combine with the metallic surfaces at the ordinary temperature, they are all of them in the same circumstances in that respect; and if the temperature should be required more elevated, the gasiform state of these substances, iodine not excepted, enables us to submit the metals to be experimented upon all at the same time to the same influence. If, therefore, it were possible to reduce the metallic substances into fine powders the particles of which were of the same dimensions, by acting upon them with either of these vapors, an idea might be formed of the affinities which produce their binary compounds by the increased weight acquired by the powders in this process; but the difference which exists in the physical properties of the various metals would preclude the possibility of any near approach to accuracy in this mode of proceeding; but by acting on the polished metallic surfaces, as in the preceding experiments, all the advantages offered by the process with the powders are included, whilst several of the difficulties are removed.

As the film of the compound augments, it undergoes the various changes of color which take place in all transparent films, thus affording a means of ascertaining the absolute thickness obtained in different circumstances, when it would be difficult to detect the slightest difference in weight by means of the most delicate balance. The depth of this coating may be ascertained when either the index of refraction of the compound itself is known, or if the angle of polarized light is given by means of the law discovered by Sir David Brewster, between the tangent of the angle of polarization, and the index of refraction. The most convenient way which occurred to me of performing these experiments, was the employment of a bell-glass within which some iodine is fixed at the top; this apparatus being placed over the metal to be acted on, the experiment may be watched in all its progress, and the action can be retarded or accelerated at pleasure by varying the interval of the iodine from the metal, or by interposing at some distance from its surface a disc of paper so as to cause the vapors of iodine to pass through it. Bromine may be made use of likewise by pouring a few drops of it over some carded cotton, and using it in a similar manner with the iodine. In respect to chlorine, it is most convenient to disengage it slowly by dropping a little sulphuric acid upon some chlorinated lime.

In illustration of the objects of this mode of experimenting, I will aduce some of the results it has given me with various metals. Some of the experiments below were performed before I had the idea of watching the progress of the combination through a transparent medium; they are therefore less exact than they might otherwise have been: but I have preferred stating them as I had inserted them in my note-book before I had conceived any idea as to their probable utility in the elucidation of chemical affinity, and when I intended them for other purposes, which I shall hereafter explain.

Iodine with Silver and Copper.

1st change.	Silver——pale gold.
"	Copper—assumes a darker red.
"	Silver——blue.
2nd do.	Copper—blue.
"	Silver——white.
3rd do.	Copper—white.
"	Silver——yellow.
4th do.	Copper—yellow more extended than on the silver.
"	Silver——Orange.
5th do.	Copper—Red.
"	Silver——blue, bluish-red.

" Copper—red, with a tinge of green on some parts.
" Silver—greenish blue.
" Copper—red, tinged with green.
" Silver—green.
" Copper—orange.
" Silver—yellowish green.
" Copper—orange tending to red.
" Silver—yellowish green.
" Copper—orange-red.
" Silver—red.
" Copper—dull green.
" Silver—red.
" Copper—green.
" Silver—deep green.
" Copper—dull red.

Bromine with Silver and Copper.

5th change. Copper—sensibly darkened.
" Silver—unchanged.
" Copper—deep red.
" Silver—unchanged.
" Copper—red, blue.
" Silver—pale gold.
" Copper—white, orange of the 2d order.
" Silver—yellow.
" Copper—green of the 1st order, red 3rd order.
" Silver—blue.

Chlorine with Silver and Copper.

The affinity of chlorine with silver is much inferior to that which it possesses for copper.

Iodine with Titanium.

Iodine at the common temperature has no action upon this metal.

Bromine with Titanium.

Bromine, when the surface of this substance is perfectly dry, has no more action upon it than iodine; but if it have a slight coating of moisture, as is formed by merely condensing on it the vapor of the breath, the colored films are formed without difficulty by the vapors of bromine. Their appearance is the same as those of the iodide of silver, viz. gold, deep gold, blue, white, yellow, orange, red, &c.

Chlorine with Titanium and Copper.

Titanium has a stronger affinity than it has for either of the preceding vapors. The combination takes place when the metallic surface is either dry or moist.

Copper—much reddened.
Titanium—not affected.
Copper—passed through several of the spectral orders of red and green until it arrived at almost its last changes of colors.

Titanium under the same action received a dull film, which viewed obliquely showed red, green, yellow.

Silver, exposed to the same influence as the two former, had yellow in the centre and blue more externally.

Iodine with Bismuth and Silver.

Silver—pale gold.
Bismuth—some parts yellow, others not attacked.
Silver—blue, white, yellow, orange.
Bismuth—blue, yellow, orange.

In the action of iodine on bismuth, the influence of the physical condition of metallic surface is very manifest. The crystaline texture of this metal may be perceived, and the difference of its hardness admits, to a certain point, of being measured by the difference of the color of the films that are formed on various points; while most parts are yellow, there exist others of an angular outline which remain still unattacked; the same difference is remarked in the other stages of the combination.

Iodine with Mercury.

It is impossible to estimate the affinity between mercury and iodine by means of the colored films, because, on combining, these two substances merely cause a dirty white appearance on the surface of the latter. Their combining affinity appears to be considerable, for when exposed together with silver the action produced with both was red at the edges, little altered in color; on the rest of its surface a dull white film, in the midst of which were

seen several dark spots, where the metal was apparently unaltered.

Bromine with Mercury and Copper.

1st. Mercury—gold color.
" Copper——slightly darkened.
2nd. Mercury—blue.
" Copper——dark red.
3rd. Mercury—green on some parts.
" Copper——white.

After this the copper underwent its usual changes of color on prolonging the action of the vapor of bromine, but the color of the mercury suffered no further change.

Chlorine with Mercury and Copper.

Mercury—a slight film.
Copper——no alteration of color.
Mercury—deep gold color.
Copper——deep red on some parts, blue on others.
Mercury—red tinged with blue.
Copper——blue, white.
Mercury—blue.
Copper——same as before.

With respect to the bromide and chloride of mercury, it is necessary to view them obliquely in order to perceive all the changes of color they undergo; for if looked at perpendicularly, there is seen on both a dull uneven film of white which reflects none of the above colors: consequently, to avoid any error, the copper must be inspected under the same angle.

Bromine with Bismuth and Silver.

Silver—pale gold.
Bismuth—not apparently changed.
Silver—deep gold, blue.
Bismuth—yellow, blue.
Silver—blue, yellow.
Bismuth—dull colorless film.

Chlorine with Bismuth and Silver.

Bismuth is slowly attacked with chlorine gas, much in the same way as with iodine and bromine in vapor.

Bromine with Lead.

At the common temperature neither bromine nor chlorine forms colored films upon this metal, which it is very difficult besides to bring to any high state of polish on account of its softness. But when lead is heated, as over the flame of a spirit-lamp, the vapors of bromine then form very fine colored films, which are in succession gold, deep blue, &c.

Iodine with Iron.

These two may be made to form colored films when combined rapidly together, but generally a dull coating without any spectral color is obtained, on account of the deliquescence of that salt.

Until we know the index of refraction of the different films enumerated, it would be impossible to give a correct table of the combining powers in the experiments that have been detailed; nor is the table of the relative thickness of transparent plates as it has been transmitted to us by Newton, sufficient in the present instance, if any great degree of precision be required. Besides these objections, it is necessary before leaving this subject to pass in review several others inseparable from the mode of performing the experiments themselves. The principal circumstances complicating these experiments and liable to vary in different observations, are,—

First, the hardness of the metal acted upon; 2ndly, the obstacle opposed to the continuation of chemical action by the inert film formed upon the metal; 3rdly, the force of the vapors that attack the metal. The influence of the texture of the metallic surface on chemical action is most evident when bismuth is the metal employed. Here the chemical action may be seen to commence on small isolated portions of the surface, which have already assumed a deep gold color, before other parts are in the least changed, from the natural appearance of the metal. To determine how far this might influence the formation of the iodide of silver, a silver coin was exposed to iodine with a piece of pure silver; as the former was so much the harder of the

two, it was naturally supposed that the chemical action would be slower in exerting itself on it than on the latter. This, however, was not the case, as may be seen by the following statement of the result of the experiment:

Silver coin—pale gold color.
Pure silver—pale gold.
Silver coin—deep gold.
Pure silver—deep gold.
Silver coin—light blue.
Pure silver—light blue.
Silver coin—yellow.
Pure silver—blue, white, yellow not visible.
Silver coin—yellow, red at edges.
Pure silver—yellow, no red edges.
Silver coin—red, blue at edges.
Pure silver—yellow, no red apparent.

The intensity of the resistance offered by the different films of iodide of silver to a continuation of the chemical combination, may be determined by noting the moment at which the various spectral tints make their appearance.

	Color of the film of iodide of silver.
0	50—beginning to darken.
2	0—pale gold.
4	40—deep gold.
6	40—orange blue.
7	30—blue.
9	30—light blue.
11	30—commencement of yellow.
18	30—orange red.
20	15—blue.
22	55—deep biue.
24	40—green.
28	0—yellowish green.
30	25—ruddy brown.
40	10—green.
46	30—green.
50	10—red.
53	15—green.

By comparing the thickness of the colors with the space of time required for their production, it will be found, however imperperfect the table given by Newton may be when applied to this subject, that towards the end of the experiment above given, the chemical combination is retarded by the presence of the inert film, and that to obtain the same thiekness of film as at the commencement, about double the time is required.

The third cause of error may be avoided by operating with vapors of about the same force. In those described, the average time employed in passing to the maximum was generally about half an hour; if that were not taken into consideration, different results might be obtained.

In regard to chlorine, there exists another cause of complication—the affinity which it possesses for water; for when disengaged in the ordinary manner, chlorine carries with it a certain quantity of water which may very much alter the results of the experiment.—*Philosophical Magazine*, 1842.

THE AMERICAN ELECTRIC TELEGRAPH.

In each of the countries of Europe where the Electric Telegraph is established, viz.: Britian, France, Germany, and Russ'a, the people seem anxious to claim for one or more of their own countrymen some merit in connection with the invention. The English speak of Wheatstone and Bain; the French of Le Sage; the Germans of Steinheil and Siemen; and the Russians of Schilling or Jacobi. Most of these inventors have their agents or representatives in different countries, ready on every suitable occasion to speak or write in behalf of their principal.

The inventor of the American Electric Telegraph has, we believe, no agent in Europe; and no person there who has any special interest in promoting the introduction of his system. The adoption of it by the Prusian government for great distances, as decidedly the best which it could obtain, after advertising extensively in Europe, is, therefore, the more remarkable; and especially, as the only knowledge which the

Prussians possess of the American system seems to have been derived from one imperfectly acquainted with its powers; for we can account in no other way for the fact that Siemen's needle apparatus is adopted for short distances; Morse's instruments being clearly superior to Siemen's, or to any other needle apparatus, for short as well as for long distances; since they are much more rapid in their motion, and have, besides, the advantage of making a permanent record on paper, instead of merely indicating to the eye by an evanescent sign. No one using the telegraph in America, would think of employing a needle apparatus in any of its operations.

In addition to the evidence of the high estimation of the American Telegraph by Europeans, furnished by this adoption of it in Prussia, we learn also from an elaborate work on Telegraphs by Dr. H. Schellen, recently published in Dusseldorf, that it is now introduced into other countries on that continent. Dr. S. says: "Of late the Morse Telegraphs are much used in Europe, viz: in England; between Hamburg and Cuxhaven; between Bremen and Bremer-haven; in Prussia, Austria, Bavaria and Hanover." Dr. S. might have added also that it is used in Turkey. Among the advantages of the American Telegraph, Dr. S. says, is its "quickness in making and marking the signs upon paper. * * *It records under the hand of a skilful operator* 100 *to* 120 *letters, in the same time in which the best needle telegraphs are able to indicate* 20."

While the *superiority* of the American Electric Telegraph to all others is thus acknowledged by Europeans, they do not seem to be aware that the date of the American invention is also *prior in point of time* to that of any of their own electric telegraphs. They very naturally regard the date of the *patent* as the date of the *invention*, because in every country in Europe the patent is given to the person who first promulgates the invention in that country; and it is not safe, therefore, in Europe, for an inventor to permit others to know any thing of his invention until he has patented it. But in America, where the law permits no one to take out a patent but the inventor, he is perfectly safe in communicating the knowledge of what he has done, and even in publicly exhibiting his invention, before he takes out his patent, provided he secures himself by a caveat, and does not offer it for sale, or permit it to go into common use.

The inventor of the American Electric Telegraph, it is well known, exhibited his instruments in operation in the N. Y. University, in the presence of hundreds of our citizens in September, 1837, and privately to his friends at various times as far back as November 1835, although his first patent was not secured until 1838. No one claims for the inventions of either Wheatstone or Steinheil a date prior to 1837; and when European writers on the telegraph come to understand our laws, and the error into which they have fallen, by confounding the date of the American invention with the patent, they will no doubt do our country the justice to admit its claims to *priority* as well as to *superiority*.—*N. Y. Observer.*

IRON PAVEMENT.—Iron is daily coming into more general use for almost every purpose. A letter from Paris, of a late date says:

"A new pavement, to upset the Macadam and other inventions of the kind, has been proposed by Mr. Tobard, who intends paving, in this way, the streets and boulevards of Paris. This gentlemen has proved, by figures, that melting iron is only worth 11 francs in Paris, 7 francs in Belgium, and 4½ francs by 100 kilogrammes in England, whilst the stone costs 25 francs in London, 15 francs in Paris, and 8 and 10 francs in Belgium. This new mode of pavement will be grooved, in order not to become slippery, and it is said that the electricity occasioned by the rolling of the carriages will prevent rust. Here is a new field open to industry."

CLAUDET'S SPECIFICATION.

SEALED 21ST NOVEMBER, 1843.

WE give the following as copied at the Patent Office in London. Many of our Daguerreotypists have enquired of us in relation to the patents on the Daguerreotype in England.

TO AUTOINE JEAN CLAUDET, of High Holborn, in the county of Middlesex, glass merchant, for an invention of improvements in the process and means of obtaining the representation of objects of nature and art,—being a communication. [Sealed 21st November, 1843.]

These improvements consist in rendering the Daguerreotype picture susceptible of producing, by printing, a great number of proofs or copies; thereby transforming it into a complete engraved plate.

The process is established on the following facts, which have come to the knowledge of the inventor:—

1st. A mixed acid, composed of water, nitric acid, nitrate of potassa, and common salt, in certain proportions, being poured upon a Daguerreotype picture, attacks the pure silver, forming a chloride of that metal, and does not effect the white parts, which are produced by the mercury; but this action does not continue long. Then, by a treatment with ammonia (ammonia containing already chloride of silver in solution, is preferable for this operation), the chloride of silver is dissolved, and washed off, and the metal being again in its naked state, or cleansed from the chloride, it can be attacked afresh by the same acid. This acid acts better warm than cold.

2d. As all metallic surfaces are soon covered (when exposed to the atmosphere) with greasy or resinous matters, it is necessary, in order that the action of the acid upon the pure silver should have its full effect, for the surface to be perfectly purified; this is effected by the employment of alcohol and caustic potash.

3d. When a Daguerreotype picture is submitted to the effects of a boiling concentrated solution of caustic potash, before being attacked by the acid, the state of its surface is so modified that the acid spares or leaves, in the part which it attacks, a great number of prints, which form the grain of the engraving.

4th. When the effects of the acid are not sufficient, or, in other words, it is not bitten deep enough, the effect is increased by the following process:—Ink the plate as copper-plate printers do, but with a siccative ink; when the ink is sufficiently dry, polish the white parts of the plate, and gild it by the electrotype process; then wash it with warm caustic potash, and bite it in with an acid, which will not attack the gold, but only the metal in those parts which having been protected by the ink, have not received the coating of gold. By these means the engraving is completed, as by the acid alone it is not generally bitten in deep enough.

5th. To protect the plate from the effects of wear, produced by the operation of printing, the following process is employed: The surface of the plate is covered with a thin coating of copper, by the electrotype process, before submitting it to the operation of printing; and when that pellicle or coating of copper begins to show signs of wear, it must be removed altogether, by plunging the plate in ammonia, or in a weak acid, which, by electro-chemical action, will dissolve the copper, without effecting the metal under it; the plate is then coppered again, by the same means, and is then ready for producing a further number of impressions. This re-coating operation may be repeated as many times as may be required. The following is the description of the whole process, which is divided into two parts, consisting of a preparatory and printing process.

Preparatory Engraving.—For this operation which is the most delicate, it is necessary to have—1. A saturated solution o

caustic potash. 2. Pure nitric acid at 36° of the barometer of Beaumé (spec. grav. 1·333). 3. A solution of nitrate of potassa, composed of 100 parts of water, and 5 parts of nitrate, by weight. 4. A solution of common salt, composed of water 100 parts, and salt 10 parts by weight. 5. A weak solution of ammoniacal chloride of silver, with an access of ammonia. The ammoniacal chloride of silver must be diluted with 15 or 20 parts of pure water. In the description of the process, this solution will be called ammoniacal chloride of silver. 6. A weak solution of ammonia, containing 4 or 5 thousandths of liquid ammonia. This solution will be called ammoniacal water. 7. A weak solution of caustic potash, containing 4 or 5 thousandths of the saturated solution, which will be called alkaline water. 8. A solution composed of water 4 parts, saturated solution of potash 2 parts, alcohol 1 part, all in volume. This solution will be called alcoholized potash. 9. Acidulated water, composed of water 100 parts, and nitric acid 2 parts, in volume. Besides, it is necessary to have three capsulæ or dishes, made of porcelain, large enough to contain the plate, and covered with an air-tight piece of ground plate glass, and two or three more capsulæ, which do not require to be covered; two or three glass funnels, to wash the plate; and two or three glass holders, in the shape of a spoon or shovel, by which the plate is supported when put in and taken out of the solution, without touching it with the fingers.

The Daguerreotype plate is submitted to the engraving process, after having been washed in the hyposulphate of soda, and afterwards in distilled water.

First process for biting in or engraving the plate.—The following solutions must be put in the capsulæ, in sufficient quantity, so as to entirely cover the plate:—1. Acidulated water. 2. Alkaline water. 3. Alcoholized potash, in covered capsulæ. 4. Caustic potash, in covered capsulæ. 5. Distilled water.

The plate being then put upon the glass holder or spoon, is plunged in the acidulated water, and agitated during a few seconds, then put into a glass funnel, and washed with distilled water. It is taken again with the glass spoon, and plunged in the capsulæ containing alcoholized potash. This capsulæ is covered with its glass cover, and then heated, by means of a spirit lamp, to about 140° Fahrenheit. The plate must remain in the capsulæ half an hour, during which the solution is heated now and then, and agitated. During that time the following acid solution, which will be called *nomal acid*, must be prepared: it is composed as follows:—Water 600 parts, nitric acid 45 parts, solution of nitrate of potassa 12 parts, solution of common salt 45 parts. These proportions are in volume. The nomal acid must be poured in a capsulæ, covered with its glass cover, and a suficient quantity must be kept in the bottle.

When the plate has been immersed in the alcoholized potash during half an hour, it is taken out of the solution by means of the glass holder, and immediately plunged in the alkaline water, and agitated pretty strongly; from thence it is put in distilled water (A). This being done, the plate is plunged in the acidulated water, and moved about therein for a few seconds: it is then put into the nomal acid. When the plate has been immersed a few seconds in the acid, it is taken out by means of the glass holder, taking care to keep it as much as possible covered with the solution, and it is immediately placed horizontally upon a stand, and as much acid as the plate can hold is poured upon it from the bottle; it is then heated with a spirit lamp, but without attaining the boiling point. During this operation it is better to stir or move about the acid on the plate by pumping it, and ejecting it again, by means of a pipette or glass syringe; after two or three minutes the

acid is thrown away, the plate is put in the glass funnel, and then well washed with water, and afterwards with distilled water (B).

Thus, without letting the plate dry, it is put upon the fingers of the left hand, and with the right hand some ammoniacal chloride of silver, which is moved about the surface by balancing the hand is poured upon it; the solution is renewed until the chloride, formed by the action of acid, is dissolved; the plate is then washed by pouring upon it a large quantity of ammoniacal water, and afterwards some distilled water. (C.)

Without allowing the plate to dry, it is then put in the caustic potash, and the capsula being then placed upon the stand, the potash is heated up to the boiling point; it is then left to cool (D); and beginning again the operations described from A, to D, a second biting is obtained; and by repeating again the operations described in A, and B, a third biting is produced. The plate is then dried; in this state the black parts of the plate are filled with chloride of silver.

The plate is then polished until the white parts are perfectly pure and bright. This polishing is soon done with cotton and ('ponce') (pumice stone); afterwards, the chloride of silver, filling the black parts, is cleansed by the means described in B, and C. The plate is dried, but before drying, it is well to rub the plate slightly with the finger, in order to take off from the black parts any remains of an insoluble body, which generally remains on it. The preparatory engraving is then finished, and the plate has the appearance of a very delicate acquatint engraved plate, not very deeply bitten in.

Nevertheless, if the operation has been well managed, and has been successful, it is deep enough to allow the printing of a considerable number of copies.

Note.—Sometimes, instead of treating the plate with the boiling potash in the capsula, a similar result may be obtained by placing the plate upon the stand, covering it with the solution, and heating it by means of a spirit lamp, until, by evaporation the potash becomes in a state of ignited fusion. By this means the grain is finer, but the white parts are more liable to be attacked.

Last operation of biting in: This operation requires some of the re-agents, beforenamed, and also,

1. A siccative ink, made of linseed oil, rendered very siccative by boiling it sufficiently with litharge; it may be thickened with calcined lampblack.

2. An electrotype apparatus, and some solutions of it to gild, and copper the plate.

Means of operating: The plate must be inked as copperplate printers do, taking care to clean off the white parts more perfectly than usual; the plate is then to be placed in a room sufficiently warm, until the ink is well dried, which requires more or less time, according to the nature of the oil employed. The drying of the oil may be hastened by heating the plate upon the stand with the lamp, but the slow process is more perfect and certain.

When the ink is well dried, the white parts are cleaned again, by polishing the plate with cotton and ponce, or any other polishing powder; a ball of cotton, or any other matter covered over with a thin piece of caoutchouc or skin, can be used for this purpose. When polished the plate is ready to receive the electro-chemical coating of gold, which will protect the white parts.

Gilding.—The gilding is obtained by any of the various processes of electrotyping that are known. The only indispensable condition is, that the surface obtained by the precipitation must not be liable to be attacked by the weak acid; a solution answering this purpose is made of 10 parts, (by weight), of ferocganide of potassium; 1 part of chloride of gold, and 1,000 parts of water, used with a galvanic battery. During the gilding the plate must be turned in several positions, in order to regulate the metallic deposit. In some cases the gilding

may be made more perfect, if the plate is covered with a thin coating of mercury before putting in the gilding solution.

When the plate is gilded, it must be heated with the boiling caustic potash, by the process already indicated for the preparatory engraving, in order to cleanse it from all the dried oil or ink, which fills the hollow. The plate is then washed and dried, and when the oil employed has been thickened with the lampblack, the surface of the plate is rubbed with crumbs of bread, in order to cleanse and take off the black remaining; then, the white parts being covered and protected by varnish not liable to be attacked, and the black parts being uncovered and clean, the plate can be bitten in by aquafortis, according to the ordinary process used by engravers.

This operation must be used upon the stand, and not by immersing the plate in the solution.

Before this biting in, if the preparatory engraving has not succeeded well, and the plate still wants a sufficient grain, it can be given by the various processes of aquatint engraving.

Before submitting the plate to the operation of printing, in order to insure an unlimited number of copies, it is necessary, as before stated, to protect it by a slight coating of copper, which is obtained by the electrotype process; otherwise the printing would soon wear the plate. This coating must be kept very thin, but the fineness of the engraving, and the polish of the white parts, should be destroyed. In this state the plate can be delivered to the printer.

After a certain number of impressions have been obtained, it will be perceived that the coating of copper is worn in some places; then this coating must be removed, and a fresh one applied in its place. For this purpose, the plate must be purified and cleansed by warm potash, and plunged in a weak acid, composed as follows:—Water, 600 parts; nitric acid, 50 parts; nitrous acid of engravers, 5 parts; all in volume. This acid will dissolve the coating of copper, and the plate being coppered again, by the same means as before, may be again submitted to the operation of printing; and as nothing can prevent the success of a repetition of the same operation, any number of impressions may be obtained. The coating of copper can also be removed by caustic ammonia. The Daguerreotype plate engraved by this process, may also be reproduced and multiplied by the electrotype process, the same as any other engraved plate.

The essential points of this process, which constitute the present invention, consist,—

First,—in the discovery and employment of certain properties of a mixture composed of nitric acid, nitrous acid, and hydrochloric acid, in detrimental or fixed proportions. The two last mentioned acids may be employed either in a free state, or combined with alkaline or other bases. This mixed acid has the property of biting the pure silver, which forms the black parts of the Daguerreotype picture, without attacking the white parts formed by the amalgam of mercury.

The result of the action of the biting is, to form on the black part of the picture an insoluble chloride of silver; and this chloride of silver, which, when formed, stops the action of the acid, is dissolved by the ammonia, which allows the biting to continue.

Secondly,—In the discovery of certain properties of a warm solution of caustic potash, and in the employment of the said solution, by which the mercury forming the picture is better and deeper amalgamated with the silver under it, so that many imperceptible points of the amalgam are affected in such a manner that the action has no action upon them.

Thirdly,—In the discovery and employment of a process which produces a grain favourable to the engraving, by which the biting on the plate is rendered deeper. This

is effected by filling the parts engraved with a siccative ink, or any other substance, and then gilding the plate by the electrotype process: the gold is not deposited on the parts protected by the ink. When the plate is gilded, the ink is cleansed by the caustic potash, and the plate may be submitted to the effect of an acid, which does not attack the coating of gold, but bites only on the silver in the parts already engraved by the first operation.

Fourthly,—In the employment of a process by which the plate is protected from the wear of the printing operation. This is effected by covering the plate before printing, with a slight coating of copper; by the electrotype process, and when the coating begins to wear, by printing, it is removed by a weak acid or by ammonia, which dissolves the copper without effecting the silver under it. The plate is coppered again, and after another printing, the same operation is repeated, so that a considerable number of copies may be printed without injury to the engraving.

Enrolled in the Pitty Bag Office, May, 1844.

INTERESTING EXPERIMENT WITH STRYCHNIA.

An interesting experiment, illustrative of the poisonous effects of strychnia, was recently made by Professor Agassiz, at Cambridge. The subject was a large black bear, about eighteen months old. The animal was taken when young, and had been kept in captivity for a considerable period. Professor Agassiz being desirous of killing it for the purpose of dissection, about three grains of strychnia were administered. The poison, though extremely bitter was readily swallowed. At the expiration of ten minutes, no effect having been produced, a second dose of about the same quantity was also inclosed in a biscuit and offered. The cunning animal broke open and swallowed the biscuit, but rejected the poison. The first portion, however, had proved efficacious, and in exactly fifteen minutes from the time when first administered, the animal was seized with terrible convulsions, and soon died.

The whole time which elapsed between the taking of the poison and the death of the animal, did not exceed twenty-five minutes. In order to alleviate its sufferings and hasten death, a quantity of hydrocyanic acid was poured upon the nose and mouth of the bear. It did not, however, produce any sensible effect, and was not *apparently* taken into the system, as the animal at the time was nearly dead. But the subsequent effects of the poison were most remarkable. Although the bear, at the time of death, was in perfect health and strength, twenty-four hours had not elapsed before the body was in an advanced stage of decomposition. Indeed the appearances indicated that the animal had been dead for nearly two months. The interior of the body, when opened about twenty hours after death, still retained its warmth in a considerable degree, while an offensive gas issued from every pore. The blood had not coagulated, the spinal marrow and nerves were in a semi-fluid state, and the flesh had assumed a leaden-gray color. The hair of the hide readily came out on being slightly pulled. No smell of the hydrocyanic acid could be perceived.

The origin of this singular and speedy decomposition is not fully known, though is is supposed to be due to the agency of the hydrocyanic acid. A chemical examination of the muscle, brain, nerves, liver and kidneys is now going on at the Cambridge laboratory, under the direction of Professor Horsford. One singular fact connected with the spontaneous decomposition of these parts is, that they all yielded or disengaged hydrosulphuric acid gas, with the exception of the liver, which did not.—*Annual of Scientific Discovery.*

The Daguerreian Journal.

NEW YORK, JUNE 1, 1851.

The metal which the Daguerreotypists have most to deal with is silver. To obtain plates of this perfectly clean and keep them so is one of the most difficult parts of his art; in order to accomplish it he is obliged to have resource to circuitous mechanical processes, or to some chemical means whereby the old surface may be removed, or a new surface deposited. He uses tripoli and rotten stone, rouge and buffing, fatty matters, alcohol, ammonia, and nitric acid, for the first purpose; and electro-plating for the second. The operator must not mistake the object he has in view. By all his mechanical operations, where friction is concerned, he obtains a *polished* surface; but it is not to *polish* the plate that he uses the buff, and the other materials; the object is to *clean* the plate, and the *polish* of the surface follows as a natural result. That a polished surface is not necessary for the formation of an image is evident from photography on paper, and Hyalotype. In these cases the surfaces do not reflect light; they are not polished; they are merely clean. The fact of a plate freshly taken out of a cell where silver has been deposited on it receiving beautiful images, is another proof that *polish* is unnecessary for success. What is wanted is a surface of pure silver, one not coated with the slightest trace of oxide, carbonate, or sulphuret of silver, or with any impurity derived by contact with foreign matter. The Daguerreotypist has, then, two objects in view:—1st, to get a clean surface on his plate; and 2nd, this once obtained, to keep it so without further alteration. Although silver is classed with gold and platinum, as one of those metals which do not tarnish or oxidize readily on exposure to the air, yet it is now well known in practice what a difference exists in the character of the picture brought out on a plate recen ly polished and one set aside even for a few hours. It is true that the atmosphere alone will not affect or oxidize a plate of polished silver, but that is only true of a very dry atmosphere; for an atmosphere which contains even a small amount of moisture in it, will in a short time dull the surface of the plate. In this instance the moisture is deposited first, and brings the air into closer contact with the surface of the metal, promoting the union of the latter with the oxygen of the air. This is exemplified every day in the case of iron, which does not rust in dry weather, but when the air begins to deposit its moisture it rapidly oxydizes. So is it with lead and zinc, but in a less degree. Pure water has no effect in tarnishing the surface of a silver plate, but if it contains even a very small quantity of animal or vegetable matter it darkens the surface in consequence of the presence of sulphur. The ordinary tarnish of silver is due to the fastening upon the surface of sulphurious vapors, which are constantly floating in the air. We are scarcely yet in possession of sufficient facts to justify the statement that sun-light materially aids in this alteration. We do know that oxidizement in any substance goes on much more rapidly in sunshine than under any other circumstances. In the vegetable kingdom it is of hourly occurrence; but the different effects of shade and shine upon the oxidizement of plates of metal has not been minutely studied. However this may be, after a time the silver surface does get coated with a film, of partly sulphuret, partly oxide, and a complete

layer of air, which so closely attaches itself to the plate that water when poured on it rolls off and does not wet the surface. It is this film of air which mechanical friction and buffing are so servicable in removing. The tarnish of a sulphuret is not so readily removed by friction as by ammonia, for the sulphuret of silver is, to some extent, soluble in ammonia; but as the sulphuret when present gives a yellowish brown tint to the surface, it is only then that it is needful, and even a weak solution of commom salt or hydrodate of potash cleans the surface much quicker.

As nitric acid is the best solvent of silver, so is it the best agent to remove films of oxide and carbonate from the surface; it does so readily, effectually, and leaves a clean new surface of silver, similar to a plate newly prepared, or one which has received a new coating in the electrotype cell. The acid, however, must be very much diluted, otherwise its local action is so immediate as to eat down the surface of the plate faster than it spreads, producing inequalities,—even when left long on, although diluted, it produces roughness; hence its use has not been happy in many hands. To such, the longer, but less failing processes of mechanical action are to be recommended in preference.

Friend Humphrey:—

I have thought for some time past that I would furnish a few thoughts for the *Daguerreian Journal*, under the head of *General Rumors*. A fear of injuring the Daguerreian business, by giving an additional publicity to my discovery, for the present has kept me from this, as well as from furnishing several other articles.

A *very few* persons (for the honor of humanity, I am glad the number is small) have made statements which reflect seriously upon the integrity and motives of myself and friends. By means of certain legal processes, of which I am not wholly ignorant, I could do *these gentry* more simple justice than by dignifying them by a notice in our Journal, yet I bear them no ill will, and *for the present* shall act on the principle that it is better to suffer wrong than to engage in a quarrel, especially with men who have so little regard for the feelings and reputation of their fellows, as to condemn, denounce, and accuse, without discrimination, and without the slightest knowledge of *facts*.

The "head and front of my offending" is this—that I *have*, by dint of unwearied pains and perseverance, succeeded in imprinting the colors of nature, in all their inimitable glory, upon the metallic surface. The process, when brought out, it is believed, by the best of judges, will be an astonishment to the world, and a delight to our nation; and I have felt, from the first, that I am but an instrument in the hands of the Almighty, and am therefore bound in duty, as well as by inclination, to dispose of the secret in a way to accomplish the greatest amount of good. In this spirit I have frequently published my unalterable resolve that my process *shall never be monopolized, or used for the purposes of extortion.* If I had no other reason for this course, the fact that there are great numbers of worthy persons engaged in our art, who, like myself, are poor, this would be sufficient. Various plans have been suggested to me, for the best possible method of disposing of my discovery. Numerous gentlemen of high standing, have honored me with personal intercourse and friendly advice. I have even suffered the claims of courtesy to interfere with my experiments, and, I believe I have the good will and confidence of those who have honored me with their visits; but I have never swerved from my original determination, and have given no person the slightest reason to think otherwise.

In view of these *facts*, it is not strange that I should feel annoyed at the various

rumors to which I refer, and some of the intimations which have been thrown out, I *feel* are but poor pay for my having nearly, if not quite, ruined my health, by laboring from morn till midnight for the good of others. More especially have I been grieved that *some of my best frends, and the best friends of the fraternity,* should be accused of having outwitted me, and drawn me into obligations to them which would compel me to pursue a grasping course. Now, it is true that certain gentlemen have, from the most honorable motives, made me very liberal offers of aid, and it is also true that my mind is about settled in regard to the parties with whom I shall act; but it is not true that I am under obligations to give notoriety to my *business affairs,* and it is certain that I shall not do so until I see fit. Neither is there the least foundation for the assertion that I am committed to any person. There confidence in me is not based on paper, but on a much surer foundation.

The process which I have been so fortunate as to discover, is *my property.* No man on earth has any claim upon it, and I have a perfect right to dispose of it as I please, in case I do not interfere with the rights of others. This, I think, is the philosophy of *Professor Morse,* so admirably and clearly expressed in the last number of the Journal. This distinguished man recently favored me with a visit, and, in the course of the interview, shed much light on this subject for which I feel truly thankful.

My intention has been, and is, to *do right,* and I believe the majority approve of the course I have pursued thus far. The many marks of approbation I have received from eminent men, both in this profession and others, is truly encouraging to me in my poor health and arduous labors, and will never be forgotten. Those who seem to possess a different spirit, and who have apparently endeavored to hedge up my way by means of "rumors," "new discoveries," "threats," &c., have my forgiveness, and I trust that, in future, if they are not disposed to aid, they will do nothing to hinder me.

The brotherhood have nobly aided me, by purchasing my book. My sales are exceeding my most sanguine expectations, and are placing me on a footing to make me *feel that I am free.* All may be assured that I shall not use my freedom "as a cloak," but to serve their interests, of which both myself and friends hope to give them *full proof* hereafter.

Now that I have been *compelled* to close my doors against visitors, I would state that I am doing my utmost to bring out my process in a short time, and I will hereafter give, in the *Daguerreian Journal,* such notices of my success as will meet the wishes of the public, as well as the interest of our fraterhity,

I am yours &c.,

L. L. Hill.

Westkill, Greene Co., N. Y.,
May 30, 1851.

☞ The foregoing letter was addressed to me privately, and as it contains some of Mr. Hill's views in relation to the various rumors afloat, I have thought it best to insert it for the public.

S. D. H.

We take pleasure in saying to our friends that, through the kindness of John Johnson, Esq., of this city, we have received many of the valuable letters and papers written by Mr. S. A. Wolcott, a former partner of the first named gentleman. Mr. W. is well and favorably known as one of our early and most successul investigators in the Photogenic Art. Many of the most valuable improvements had their origin in his hands. We were surprised to find so great an amount of information as is here presented.

Our Daguerreotypists of the present day may consider themselves fortunate, when

looking back upon the difficulties experienced by those early engaged in putting a shadow on the silver plate. We find here many a mystery unravelled, and set forth in a light heretofore unexplained. As these letters, written by Mr. W. to his partner, Mr. J., (at the time they were written) were many of them confidential, and some few contain business matter of a foreign character, it will require some little time to prepare them for the press in the order in which they were written. We shall make no alteration in the manuscript, and exclude such matter only as relates to business of a foreign character. They present a team of investigation and research worthy the first in the scientific circle.

We would here take occasion to speak of a curious specimen of our art, which we saw while recently spending an evening with Mr. Johnson. This specimen is a profile view of a gentleman, and if not the *first* likeness from life, it is said to claim age with the oldest Daguerreotype ever produced, and is no less interesting for its antiquity than for its size, it being on a plate *less than one quarter of an inch square.* To produce an impression on such a plate it would require the superior skill of the most successful operator of the present day. The outline is distinctly marked, the features remarkably well delineated, being in fact, one of the most interesting curiosities we have ever witnessed. The plate is cemented by means of Canada Balsam to a piece of plate glass about three-fourths of an inch square, and thus it has been preserved in its present state.

We saw many other specimens of Daguerreian antiquity, but as we intend to speak more fully of our evening visit at Mr. Johnson's, we will defer further notice for the present.

We would here say to such as may have Mr. Walcott's letters relative to the art, that we would consider ourselves especially favored if we could be allowed the perusal of them.

THE NATURAL COLORS IN PHOTOGRAPHY.

The subscriber begs to request those interested in the above discovery *not to visit him* until further notice, which will be given in the Daguerreian Journal. It is *absolutely essential* that he should have his time, and be left undisturbed. Stern necessity, arising from the fact that I can never complete my process if disturbed as hitherto, compels me to say both to friends and strangers, that my doors are locked, and will continue to be until I have completed my experiments. As this notice is given with a regard to the general good, it is presumed no offence will be taken.

L. L. Hill.

Westkill, Green Co., N. Y.,
May 25, 1851.

Editors by inserting the above in their papers will confer a favor, and save many from spending their time and money to no purpose.

Our Daguerreotypes.

Butler, of this city, is now producing fine likenesses in oil. This gentlemen calls these pictures "Daguerreotypes in Oil." We never have seen better likenesses transferred from a Daguerreotype, and in an economical point of view, they are the best oil paintings that can be had.

E. Long, of St. Louis, Mo. In our last, we spoke of H. H. Long as the gentleman who had produced likenesses of Jenny Lind. This was incorrect; we should have said E. Long. However, they both are a *long* ways from taking poor Daguerreotypes.

L. M. Ives. of Boston, will please pardon us (or rather our printer) for the mistake in the Journal in his name and locality. Mr. I. being himself a sure operator, will certainly pardon a failure in others. We will endeavor to do better in future.

N. E. Sissons, of Albany. This gentleman has completed an extensive addition to his former establishment. We find here one of the most substantial proofs that close application and honorable dealing are awarded by success. Mr. S. has now five rooms —one for reception, a gallery or operating room, and three stock rooms. It is highly gratifying to his friends to learn of his success, and we predict for him a large and profitable business. We have ordered one of C. C. Harrison's best full sized camera tubes, and one of W. & W. H. Lewis' camera boxes, which will be forwarded to Mr. S., he being entitled to it from the fact that he has obtained for us the largest list of subscribers. He is a "practical operator."

J. D. Wells, Northampton, Mass., has recently fitted up a large establishment in that place. Mr. W. is an old an experienced operator, and has five rooms in his establishment, a very fine sky and side light, and is prepared to execute such likenesses as will please the inhabitants of that beautiful village in the valley of the Connecticut.

SUBMARINE TELEGRAPH BETWEEN ENGLAND AND FRANCE.

The project of constructing a submarine telegraph between England and France, across the Straits of Dover, first announced during the year 1849,* has been in part accomplished. The following description of the laying down of the wire, we copy from an English Journal:—

* See Annual of Scientific Discovery, 1850, page 128.

At one o'clock the steamer Goliah was ready to start across the Channel, with all the necessary apparatus on board, and a crew of about thirty men. Between the paddle-wheels, in the centre of the vessel, was a gigantic drum, or wheel, nearly fifteen feet long and seven feet in diameter, weighing seven tons, and fixed on a strong framework. Upon it was coiled up, in careful, close convulusions, about thirty miles of telegraphic wire, one-tenth of an inch in diameter, incased in a covering of guttapercha, the thickness of the little finger. The point proposed to be reached, Cape Grinez, the nearest landmark to the English coast, and between Calais and Boulogne, is a distance of twenty-one miles, so that a surplus supply of nine miles of wire was held in reserve for the purpose of slackening. The connecting wires were placed in readiness at the Government pier in the harbor, and likwise at the Cape, where they run up the face of the acclivity, which is 194 feet above the sea-mark.

Some interesting experiments were first made upon a small scale to show the practicability of the plan. A mile of wire was paid out off the deck, from the pier to Shakspeare's Cliff, and the sinking process was proved to be a practicable performance. A communication was also sent through twenty-four miles of wire. On Wednesday morning the experiment of sinking submarinely was practically commenced. The Goliah put out to the pier, with her telegraphic tackle and apparatus on board, under a calm sea and sky and a favoring wind. The connection between the thirty miles of telegraphic wire was then made good to 300 yards of the same wire inclosed in a leaden tube on shore, to prevent it being bruised by the shingle on the beach, and to enable the experimenters, as they proceeded out to sea, to send communications on shore. The vessel steamed out at the rate of three or four miles an hour into the open sea, in a direct track for Cape Grinez. The wire weighed five tons and

the cylinder two. The operation of paying out the thirty miles of wire commenced on a signal to the sailors to "Go-ahead with the wheel, and pay out the wire," which was continuously streamed out over a roller at the stern of the vessel, the men at every 16th of a mile being busily engaged in riveting on to the wire, square leaden clamps, or weights of iron, from 14 lbs. to 24 lbs. in weight, which had the effect of sinking the wire to the bottom, which, on the English coast commences at a depth of 30 feet, and goes on varying from that to 100 and 180 feet, which latter, or 30 fathoms, is the greatest depth.

The whole of the casting out and sinking was acccomplished with great precision and success, owing to the favorable state of the day. The only conjectured difficulty on the route was at a point in midchannel, called the Ridge, between which and another inequality called the Varne, both well known and dreaded by navigators, there is a deep submarine valley, surrounded by shifting sands, the one being seventeen miles in length, and the other twelve, and in their vortex, not unlike the voracious one of Godwin Sands, ships encounter danger and lose their anchors, and trolling nets of fishermen are frequently lost. Over this, however, the wire was successfully submerged, below the reach, it is believed, of either ship's anchors, sea-animals, or fishing nets. The remainder of the route, though rougher on approaching the coast of France, was accomplished cleverly, but slowly. A communication, dated Cape Grinez, Coast of France, half past eight, P. M., and received at Dover by submarine telegraph, was as follows:—"The Goliah has just arrived in safety, and the complete connection of the under-water wire with that left at Dover this morning is being run up the face of the cliff; complimentary interchanges are passing between France and England, under the strait and through it, for the first time."

Notwithstanding this apparently successful result of the work, the line was cut assunder soon after the connection was completed on the rocks near Cape Grinez, the physical configuration of the French coast being very unfavorable. The precise point where the breakage took place was about two hundred yards out to sea, just where the twenty miles of electric line that had been laid down from Dover joins on to a leaden tube designed to protect it from the surge beating against the beach, and which also serves a similar purpose up the front of the cliff to the station upon the top. The leaden conductor, it would appear, was of too soft a texture to resist the oscillation of the sea, and thereby became detached from the coil of gutta-percha wire that was thought to have been safely encased in it. The occurrence was, of course, quickly detected by the sudden cessation of the series of communications, though it was at first a perplexing point to discover at what precise spot the wire was broken or at fault. This, however, was done by hauling up the line at intervals, a process which disclosed the gratifying fact, that, since its first sinking, it had remained *in situ* at the bottom of the sea, in consequence of the leaden weights or clamps that were strung to it at every sixteenth of a mile. The experiment, as far as it has gone, proves the possibility of the gutta percha wire resisting the action of the salt water, of the fact of its being a perfect waterproof insulator, and that the weights on the wire are sufficient to prevent it being drifted away by the currents, and for sinking it in the sands.

The work at present has been suspended, but will be resumed again during the spring of 1851; a somewhat different plan, however, has been proposed to be followed from that at first adopted. Instead of one slender wire, it is intended to lay down cables inclosing four lines. These cables will be composed of gutta-percha, four or five inches in thickness, the whole encased in wire rope, chemically prepared, to protect it from rot, and kyanized. There will be

two of these cables, each twenty miles long, and three miles apart, the whole weight representing 400 tons; and it is expected, when chained down in the bottom of the sea, they will be of sufficient consistency and strength to resist the anchor of a 120-gun ship. The expense of the cables is estimated at £40,000. It is thought that the whole work may be accomplished by May, 1851.—*Annual of Scientific Discovery.*

ACTION OF SOLUTIONS OF CHLORIDES AND AIR ON MERCURY.

We have given in previous Numbers the results of M. Mialhe's experiments on the action of chlorides on some mercurial compounds, and he states that he had nearly concluded his experiments when it occurred to him to try whether murcury itself would not be acted upon by this class of substances.

Experiment, he states, confirmed his suspicions, for he found that the solutions of the alkaline chlorides put into contact with mercury and atmospheric air always produced bichloride of mercury, the quantity of which was greater in proportion to the concentration of the solution of the chloride, and the more perfect state of division of the metal, but no effect is produced unless oxygen, that of the air being sufficient, is present.

1*st Experiment.*—Mercury treated with the solution of alkaline chlorides (described in our last Number as the *assay liquor*), gave by stove heat 0·4 part of sublimate.

2*nd Experiment.*—The above repeated with the mercury finely divided by mucilage, yielded 0·7 part of sublimate.

The researches already detailed sufficiently prove, in the opinion of M. Mialhe, that the decomposing power of the alkaline chlorides is great, but they do not teach us anything as to their relative energy. The following experiments will supply this deficiency.

Hydrochlorate of Ammonia.—One hundred and twenty parts of hydrochlorate of ammonia and 30 parts of calomel were placed in an open bottle containg 1000 parts of distilled water, the temperature of which was gradually raised to 122° Fahr., and kept for half an hour; the sublimate produced amounted to 0·9 of a part.

The experiment repeated with the following salts gave the annexed quantities of sublimate:—

Chloride of Sodium,	- -	0·4 of a part.
Chloride of Barium,	- -	0·4 "
Chloride of Potassium,		0·3 "

It results from these experiments that the hydrochlorate of ammonia is the most powerful of these four salts.

In concluding his experiments, M. Mialhe remarks that the reactions which he has pointed out take place at common temperatures, but better at the temperature of the human body. All of them are produced in a short time, and some occur instantaneously, the greater part requiring only a few hours' contact for action. As then the different fluids contained in the human body contain oxygen, chloride of sodium, and hydrochlorate of ammonia, accompanied or not with hydrochloric and other acids which may facilitate their action, it follows that all the chemical phenomena produced under the circumstances described, occur in the human body when any mercurial preparation whatever is introduced into it; these always produce a certain quantity of corrosive sublimate in which their medicinal properties reside; and this fact explains, in the opinion of M. Mialhe, the hitherto unexplained physiological action and therapeutic properties of metallic mercury when introduced into the animal economy.—*Ann. de Chim. et de Phys.*, Juin 1842.

THE HEAT OF COMBINATIONS.

Every molecular change in the condition of matter is almost invariably connected with the evolution or absorption of heat, and the quantity of heat thus set free or absorbed bears always a definite relation to

the amount of the mechanical or chemical action. To ascertain this relation has been the object of my investigations, and the following are a few of my principal results. 1. The solution of a salt in water is always accompanied by an absorption of heat. 2. If equal weights of the same salt be dissolved in succession in the same liquid, the heat absorbed will be less on each new addition of salt. 3. The heat absorbed by the solution of a salt in water holding other salts dissolved is generally less than that absorbed by its solution in water. 4. The heat absorbed by the solution of a salt in the dilute mineral acids is generally greater than that absorbed by its solution in water. In reference to the combination of acids and bases, the heat developed during the union is determined by the base, and not by the acid. An equivalent of the same base combined with different acids produces nearly the same quantity of heat. When a neutral salt is converted into an acid salt by combining with one or more equivalents of acids, no disengagement of heat occurs. When a double salt is formed by the union of two neutral salts, the same is the case, but when a neutral salt is converted into a basic salt, there is a disengagement of heat. When solutions of two neutral salts are mixed, and a precipitate formed from their mutual decomposition, there is always a disengagement of heat, which, though small, is perfectly definite in amount. The diamond disengages 7,824 units of heat during its combustion in oxygen gas, in the form of graphite, 7,778 units, and in that of wood charcoal, 8,080.—*Dr. Andrews before the British Association at Birmingham.*

[The following papers have been furnished us by Mr. Pirsson, one of the former editors of the *Eureka*, they having been previously published in that Journal; for the cuts, which will appear in our next number, we are indebted to Mr. Starr, one of the present editors of the *Farmer and Mechanic*, and formerly publisher of the *Eureka*.]

DAGUERREOTYPE.

BY JOHN JOHNSON.

As a general thing, however perfect any invention may be deemed by the inventor or discoverer, it falls to the lot of most, to be the subject of improvement and advancement, and especially is this the case with those new projects in science which open an untrodden field to the view of the artizan. Such has been in an eminent degree, the case with the discovery first announced to the world by Mons. Jean Jaques Claude Daguerre, of Paris, in the year 1839, and which excited unbounded astonishment, curiosity and surprise. It may be questioned had any other than Daguerre himself discovered a like beautiful combination, whether the world would have been favored with details exhibiting so much care, patience and perseverance as the Daguerreotype on its introduction. Shortly after these details reached the United States, by Professor S. F. B. Morse, of New York, who was, at the time of the discovery, residing in Paris. By this announcement, the whole scientific corps was set in operation, many repeating the experiments, following carefully the directions pointed out by Daguerre, as being necessary to success. Among the number in the United States, was Alexander S. Wolcott (since deceased) and myself, both of this city. On the morning of the 6th day of October, 1839, I took to A. Wolcott's residence, a full description of Daguerre's discovery, he being at the time engaged in the department of Mechanical Dentistry, on some work requiring his immediate attention, the work being promised at 2, P. M., that day; having, therefore, no opportunity to read the description for himself, (a thing he was accustomed to do at all times, when investigating any subject,) I read to him the paper, and proposed to him that if he would plan a camera, (a matter he was fully acquainted with, both theoretically and practically) I would obtain the mate-

rials as specified by Daguerre. This being agreed to, I departed for the purpose, and and on my return to his shop, he handed me the sketch of a camera box, without at all explaining in what manner the lens was to be mounted. This I also undertook to procure. After 2, P. M., he had more leisure, when he proceeded to complete the camera, introducing for that purpose a reflector in the back of the box, and also to affix a plate holder on the inside, with a slide to obtain the focus od the plate, prepared after the manner of Daguerre. While Mr. Wolcott was engaged with the camera, I busied myself in polishing the silver plate, or rather silver plated copper, but ere reaching the end preparatory to iodizing, I found I had nearly or quite removed the silver surface from off the plate, and that being the best piece of silver plated copper to be found, the first remedy at hand that suggested itself, was a burnisher, and a few strips were quickly burnished and polished. Meantime, the camera being finished, Mr. Wolcott, after reading for himself Daguerre's method of iodizing, prepared two plates, and placing them in the camera, guessed at the required time they should remain exposed to the action of the light ; after mercurializing each in turn, and removing the iodized surface with a solution of common salt, two successful impressions were obtained, each *unlike the other!* Considerable surprise was excited by this result, for each plate was managed precisely like the other. On referring to Daguerre, no explanatiod was found for this strange result; time, however, revealed to us that one picture was positive, and the other negative. On this subject I shall have much to say during the progress of the work. Investigating the cause of this difference occupied the remainder of that day, However, another attempt was agreed upon, and the instruments, plates, &c., prepared and taken up into an attic room, in a position most favorrable for light. Having duly arranged the camera, I *sat* for five minutes, and the result was a profile miniature, (a miniature in reality,) on a plate not quite three-eighths of an inch square. Thus, with much deliberation and study, passed the *first* day in Daguerreotype—little dreaming or knowing into what a labyrinth such a beginning was hastening us.

(*To be continued.*)

GALVANIZING DAGUERREOTYPE PLATES.

The Battery. The best way is to purchase a good Daniel's Battery. Price $2 00. To be had at any of the dealers.

For the benefit of those who cannot procure one, I would give the following directions for *making one*: Procure a copper cup, (sheet copper) 6 inches high, and 4 inches in diameter; also a cup of porous earthenware, (a small unglazed flower pot answers,) or a *leather* cup made water tight by sewing, or even a cylinder of porous wood, (say maple or ash,) 3 inches diameter, and about 6 inches high. This is to stand in the centre of the copper cup. Now, procure a solid cylinder of zinc, 6 inches high and 1 inch diameter. This is to stand in the centre of the porous cup. Fastened to the upper end of the zinc cylinder there should be a copper wire, pretty thick. It should be held by a screw, or soldered on, and previous to the fastening, both the wire and zinc should be made clean and bright, that there may be a perfect *connection*. A similar wire is to be fastened, in the same way, to the upper rim of the copper cup. Let these wires be about 6 inches long. To the end of the one coming from the copper fasten a *plate of pure silver*, about as large as a quarter plate, unless you wish to galvanize whole plates, in which case the silver plate must be larger, say, the size of a half plate. For small plates a *silver dollar*, enlarged to twice its size by hammering, will answer, but is not so good. To

hammer it, it must be first heated, red hot, and allowed to cool slowly. This plate is to be immersed in the silver solution, described below, near the side of the solution jar. The other wire must be bent at the end like a hook, to receive the catch. This catch may be a piece of copper wire about 4 inches long, hooked at one end, and having several turns at the other end, to strengthen it. Between these turns the Daguerreotype plate, well polished, is inserted, as in a sort of jaw. The wire holding the catch should be so bent that the Daguerreotype plate will stand from one to three inches from, and face the annode, or silver plate.

Let the silver solution be well stirred, just before immersing a plate; then, blowing away the froth and scum, immediately dip the plate, and hang it on the wire. Let it remain until it takes on a deep blue color, take it out, grasp it with the plyers, rinse it freely with clean water, and dry it carefully with a spirit lamp. Buff again to a polish, galvanize to a light blue, rinse, dry, and buff again, and it is ready for the coating box.

Silver Solution. Dissolve in 1 quart of soft water, half a pound of *Cyanide of Potash.* In this dissolve the *Chloride of Silver* procurable from a silver dollar. Filter, through paper, or clean sponge, and it is ready for use, excepting that it will probably have to be reduced with water. It should be reduced till it works mellow, and free from streaks. The occasional addition of a lump of cyanide will prevent a flowery deposite of oxyde of silver. Occasionally, also, add a little chloride of silver, and more cyanide. The cyanide should always be in excess. The reason why this should be occasionally added, is that the solution becomes too strong, with the silver, from the annode. The connections must be kept bright, with a file or otherwise.

The manner of *charging* the above battery is as follows: Nearly fill the porous cup with water, and stir in about a teaspoonful of sulphuric acid. Two or three drops of acid added once a week is enough. The copper cup should be filled with a saturated solution of sulphate of copper, (blue vitriol,) and the solution kept saturated by suspending in it a little sack of the blue vitriol.

☞ The zinc cylinder, previous to use, should be *amalgamated*, as follows: Place it in a plate, and brighten it by rubbing it with a swab, wet with dilute sulphuric acid. Then with the same swab, rub on mercury, until the whole surface is bright.

Chloride of Silver. Dissolve a silver dollar in about a gill of a mixture of nitric acid and water, equal parts, by the aid of a gentle heat. Let it cool. Throw it into an earthen or glass vessel, containing about 1 quart of strong salt water. Let the precipitate settle. Pour away the liquid, add a large quantity of water, let the chloride of silver settle, pour away the water, and repeat this at least fifty times. The residue is pure chloride of silver.

Any glass or earthen cup, of suitable shape and dimensions, will answer for a *solution dish.*

It should be remembered that a strong battery, and a strong solution require the plate to be kept at a greater distance from the annode. This distance will range from one to three inches.—*Hill's Treatise.*

ANSWERS TO CORRESPONDENTS.

Notice.—Those persons subscribing for this Journal will please bear in mind to write in a plain hand the *name*, *town*, *county*, and STATE. By observing the above you will save us much trouble, and, at the same time, receive the Journal with more promptness.

G. K. W., Mass.—We have been unable to prepare the chemicals you ordered. Our arrangements are somewhat extensive in the department referred to.

M. S. W., Ala.—Mr. W. says, "Will you inform me, through your Journal or otherwise, Is iodine entirely lost when it combines with a few drops of a solution of potassa?"

It is not. The following experiment will better illustrate:—Put a few grains of iodine into a

clean and dry Florence flask, warm it gradually over a spirit lamp, and the iodine rises in a vapor of beautiful violet color. When cool, pour in "a few drops of a solution of potassa," the iodine disappears at once, and a solution of iodide of potassium is formed; this may be heated to redness without evolving any violet fumes, and yet it is certain that iodine is there, but not in a free but a combined state, and heat cannot expel it from combination with the potassium. Let the flask cool a little, and add a few drops of sulphuric acid; the violet fumes of iodine instantly appear; the sulphuric acid has induced the formation of sulphate of potassa, and expelled the iodine unchanged.

F. B. B., Ky.—Your money is received, and the first Vol. forwarded per order. Thank you for your hearty congratulations.

J. G. P. R. I.—Yours of the 26th in hand. We advise you for the *present* to say nothing of your discovery: it probably has more valuable importance than you are at present aware of.

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